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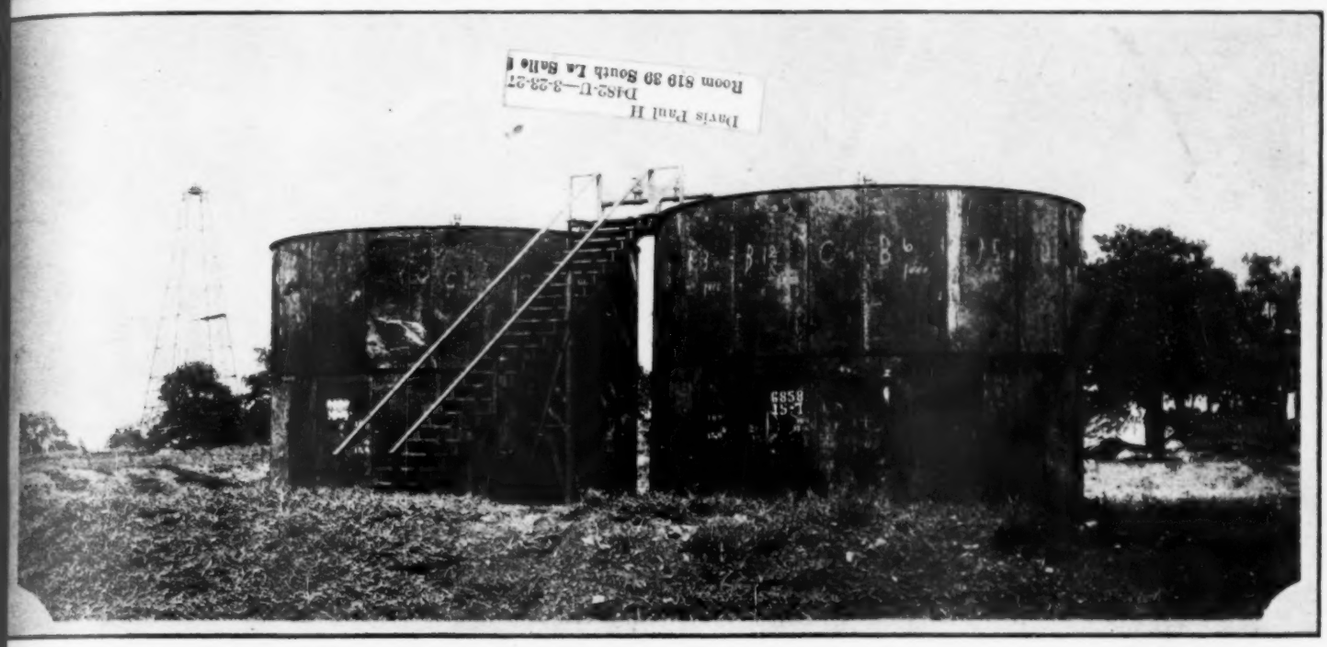

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Advertisers' Index on Page 25 Table of Contents on Page 26

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The ADVERTISERS' INDEX

A

...e Fishing Tool Co. .....
...n Iron Works 308-309
...n Rope Co. 375
...n, Blauner & O'Dell C-109
...-Chalmers C-43
...rillo Abstract Co. 372
...erican Appraisal Co. .....
...erican Asphalt Paint Co. .....
...erican Blower Co. C-191
...erican Car & Foundry Co. C-63
...erican Paint & Supply Co. C-189
...erican Radiator Co. 95
...erican Roller Bearing Co. 368
...erican Rolling Mill Co. 324
...erican Schaeffer & Budenberg Corp..369
...erican Seamless Tube Corp. of Calif. C-162
...erican Sheet & Tin Plate Co. .....
...erican Spiral Pipe Works C-186
...erican Telephone & Telegraph Co. ..
...erican Well Works .....
...erson & Anderson 376
...erson, Carl B. 376
...erson Engine & Foundry Co. C-155
...rews Steel Co. 366
... Company, The 8
...strong Bros. Tool Co. 372
...whead Iron Works, Inc. C-172
...y Truss Wheel Co. 329
...s Ball Co. 302
..., C. A. 376
...in Co. C-69
...son Machine Co. 315

B

... A. Specialty Co. C-162
...h-Ross Tool Co. .....
...ock & Wilcox Tube Co., The C-36
...r Casing Shoe Co. 367
...win Chain & Mfg. Co. .....
...er Asphalt Co. C-113
...e-Greene Co. .....
...ickel, Wm. S., & Co. 373
...esville Supply Co. .....
... City Mfg. Co. .....
... Lumber Co. C-169
...mer Gas Engine Co. C-150-C-151
...ll & Keeler Machine Works 79
...mer Pump Co. 96
...-Knox Co. .....
...n Co. C-45
...ird & Seyfang Mfg. Co. .....
...ird Supply Co., The 4
...er, S. F., & Co., Inc. C-156
...en Steel & Winch Co. 292-293
...y Conveyors Corp. 55
..., C. F., & Co. C-89
...eport Machine Co. 14
...il Co. C-155
...erick & Bascom Rope Co. 59
...aw, Dixon, Garner & McKee 376
...ka Engineering Corp. .....
...rn, Arthur C. 374
...nell Co. 376
...n Instrument Co. 60-61
...n & Thomsen 375
...keye Traction Ditcher Co. C-38-C-39
... Co. .....
...lo Gasolene Motor Co. 16
...s Tool Co. 322-323
... Corporation .....
... Mfg. Co. 294
...h-Sulzer Bros. Diesel Engine Co..... 82
...er Mfg. Co. 361
...s. A. M., Co. C-117
...n Jackson Pump & Mfg. Co., Inc.... 12

C

... & E. Mfg. Co. C-59
...era Craft Studios 373
...fornia Pipe Line Machine Co. C-191
...p. C. F., Co. C-59
...pbell, J. A. 306
...bic Mfg. Co. C-18
...ondale Machine Co. .....
...dill, Samuel J. 374
...te Products Co. .....
...ral Alloy Steel Corp. 15
...ral Forging Co. .....
...ral National Bank of Tulsa C-186
...ral Tube Co. C-15
...n Belt Co. 47
...gston Machine & Forging Co. 81
...olin-Fulton Mfg. Co. 372
...pman Valve Mfg. Co. C-23
...stnut & Smith Corp. .....
...cago Bridge & Iron Works 300-301
...cago Pneumatic Tool Co. 23
...cago Steel Foundry Co. .....
...cbolm-Moore Mfg. Co. 304
...pp, Frederick G. 376
...rk Bros. Co. C-86-C-87
...rk, Robert W. 376
...ssified Wants 336-337-339
...veland Tractor Co. .....
...veland Trencher Co., The C-60
...max Engineering Co. .....
...umbian Rope Co. .....
...umbian Steel Tank Co. C-93
...umbus Forge & Iron Co. .....
...umbus Sucker Rod Co. .....
...ntinental Motors Corp. .....
...ntinental National Bank of Fort Worth C-173
...ntinental Supply Co. .....
...ntinental Oil Co., 80, C-83, C-105, C-110, C-114
...oper, C. & G., Co. 25-26
...x & Sons Co., The .....
...ane Co. C-90-C-91
...ane Packing Co. C-67
...own Central Petroleum Corp. 69

D

... & B. Pump & Supply Co. .....
... & N. Specialty Co. .....
...rling Valve & Mfg. Co. 86
...rt, E. M., Mfg. Co. .....

D

Davis, G. M., Regulator Co. .....
Dayton Pipe Coupling Co. .....
Dearborn Chemical Co. C-6-C-7
DeLaval Separator Co. C-175
De La Vergne Machine Co. .....
Detroit Graphite Co. C-40
Diamond Drill Carbon Co. 374
Dixon, Joseph, Crucible Co. .....
Dodge Mfg. Co. 10
Donovan Boiler Works, Inc. .....
Dresser, S. R., Mfg. Co. 37
Dunn Mfg. Co. .....
DuPont De Nemours & Co., Inc., E. I. ..
Durabla Mfg. Co. .....
Duriron Company, The .....

E

Eagle-Picher Lead Co. 2
Earnshaw, G. W. 374
Eastern Texas Electric Co. C-148
Eclipse Paint & Mfg. Co. C-133
Edward Valve & Mfg. Co. .....
Elliott Core Drilling Co. 62
Empire Refineries, Inc. .....
Emsco Derrick & Equipment Co. .....
Equitable Meter & Mfg. Co. 48
Evens & Howard Fire Brick Co. C-173
Exchange National Bank C-8
Exner-Dodge Packer Co. C-34

F

Fairbanks-Morse & Co. 87-88
Federal Supply Co. .....
Feenberg Pipe & Supply Co., Inc. C-166
Fenwick-Reddaway Mfg. Co. 368
Fisher Governor Co. 345
Foamite-Childs Corp. 51
Fohs, F. Julius 375
Foos Gas Engine Co. C-159
Ford Chain Block Co. 364
Fort Worth Laboratories 374
Foxboro Co., Inc., The C-164
Franklin Valveless Engine Co. 84-85
Frick-Reid Supply Co. 6
Full Crawler Co. 372

G

Gallagher Co. .....
Gardner Governor Co. .....
Garlock Packing Co. .....
Gaso Pump & Burner Mfg. Co. .....
....C-73, C-74, C-75, C-76, Inside Back Cover
General American Tank Car Corp. .....
General Insulating & Mfg. Co. 366
General Motors Truck Co. 9
Gilbert & Barker Mfg. Co. .....
Gilfillan Machine Works .....
Gomory, W. L. 374
Goodrich, B. F., Rubber Co. .....
Goodyear Tire & Rubber Co. .....
Gott, H. P., Mfg. Co. .....
Goulds Pumps, Inc. C-64-C-65
Graham Brothers .....
Gray Processes Corp. .....
Graver Corp. 343
Greenspon's, Joseph, Sons Iron & Steel Co. C-57
Griscom-Russell Co. 83
Guiberson Corp. 44
Gulf Refining Co. 305

H

Halliburton Oil Well Cementing Co. ..
Harrisburg Pipe & Pipe Bending Co. ..331
Hazard Mfg. Co. .....
Heine Boiler Co. C-70
Henderson, W. K., Iron Works C-145
Heppenstall Forge & Knife Co. .....
Herall Brothers 376
Hercules Motors Corp. 327
Hercules Tool Co. .....
Heydrick Mapping Co. 374
Hill, Hubbell & Co. C-126-C-127
Hills-McCanna Co. C-51
Hinderliter Tool Co. .....
Homestead Valve Mfg. Co. .....
Hood, H. H. 376
Hoover Steel Ball Co. .....
Hope Engineering & Supply Co. ..C-20-C-21
Hopkins, Edwin B. 375
Hornblower & Weeks 365
Hough, Charles N., Mfg. Co. .....
Hoyt Metal Co. .....
Hughes Tool Co. .....Back Cover
Humble Oil & Refining Co. .....
Hunt, Robert W., Co. .....
Huntley & Huntley 375

I

Illinois Glass Co. .....
Imperial Belting Co. 370
Imperial Brass Mfg. Co. C-161
Industrial Products Co. C-101
Ingersoll-Rand Co. .....
International Derrick & Equipment Co. 72-73
International Harvester Co. of America .
International Seal & Lock Co. C-173
International Supply Co. .....
Iron King Mfg. Co. .....

J

Jarecki Mfg. Co. .....
Jefferson Union Co. .....
Jeffrey, Douglas G. 339
Johns-Manville, Inc. .....
Johnson Paint Co., Inc. C-145
Jones, S. M., Co. 20-376

K

Kansas City Hay Press Co. 325
Kaw Steel Construction Co. 5
Kellogg, M. W., Co. 365
Kelly Dempsey & Co. C-177
Kelly, John Eoghan 375
Kelly-Springfield Tire Co. .....
Kennedy Valve Mfg. Co. C-84
Kerotest Mfg Co. 318
Kerr, John B. 375

K

Keuffel & Esser Co. .....
Kewanee Boiler Co. .....
Key Boiler Equipment Co. C-182
Kirk & Hoover 376

L

Landis Machine Co. 3
LaPlante-Choate Mfg. Co. C-182
... & Co. .....
Layne & Bowler Co. .....
Leidecker Tool Co. 357
Leschen, A., & Sons Rope Co. .....
Linde Air Products Co. 1
Link-Belt Co. .....
Longyear, E. J., Co. 374
Lucey Mfg. Corp. 307
Ludlow Valve Mfg. Co. C-170
Lufkin Rule Co. 376
Lunkenheimer Co. 297

Mc

McCord Radiator & Mfg. Co. C-48-360
McGregor Working Barrel Co. 374
McIntosh & Seymour Corp. C-27
McJunkin Supply Co. .....
McKee, Arthur G., & Co. .....
McNutt, V. H. 375

M

MacGillies & Gibbs Co., The C-174
Magnolia Petroleum Co. .....
Maloney Tank Mfg. Co. .....Front Cover
Manzel Bros. Co. C-177
Marion Machine Foundry & Supply Co. ..
Marsh Gauge Pole Co. 374
Master Builders Co. 24
Mathieson Alkali Works, Inc. .....
Matson, George C. 375
Maverick, Phillip 376
Merco Nordstrom Valve Co. 17
Messmer, H. H. C-182-374
Metric Metal Works C-78
Midcon Pipe & Supply Co. C-172
Midwest Piping & Supply Co. C-123
Miller Improved Gas Engine Co. 295
Miller, Max B., & Co., Inc. .....
Mine Safety Appliance Co. .....
Missouri Wood Working Co. C-152
Modern Engineering Co. C-149
Moon Mfg. Co. .....
Moore, Lee C., & Co., Inc. 19
Mosier Metal Products Corp. .....
Munn & Co. 374
Murray Rubber Co. 367
Murray Tool & Supply Co. .....
Myers, F. E., & Bro. Co. 364

N

Nabors, W. C., Co. 319
National Carbon Co., Inc. 1
National Lead Co. 333
National Petroleum Engineering Corp. .325
National Pigments & Chemical Co. 312
National Supply Co. C-94-C-96-C-97-C-99
National Transit Pump & Machine Co. C-12-C-13
National Tube Co. 22
National Turnbuckle Derrick Co. .....
Naugle Pole & Tie Co. C-137
Newton Process Mfg. Co. 35
Nordberg Mfg. Co. C-142
Norris Bros., Inc. .....
Norris, W. C. C-52-C-53
North American Car Co. C-164
Northern Fire Apparatus Co. .....
Northern Oil Information Bureau 374
Northrup Equipment Co. 320
Nuttall, R. D., & Co. .....
Nye Tool & Machine Works 7

O

O'Brien Steel Contruction Co. .....
Ohio Mid-Cities Corp. C-161
Ohio Steel Foundry Co. .....
Oil Conservation Engineering Co. 56
Oil Country Specialties Mfg. Co. .....
Oil Insurance Association .....
Oil State Pipe Co. C-161
Oil Well Supply Co. 67
Oklahoma Armature Repair Co. .....
Oklahoma Contracting Co. C-54
Oklahoma Gas & Electric Co. C-129
Oxwell Acetylene Co. 1

P

Parkersburg Machine Co. .....
Parkersburg Rig & Reel Co. C-28
Partrige-Scotford Stamp & Stencil Co. ..
Patrick, R. S. 371
Pattin Brothers Co. 335
Penberty Injector Co. 362
Pennsylvania Engineering Works .....
Petroleum Appliance Co. 363
Petroleum Iron Works .....
Pforzheimer, Carl H., & Co. 370
Pickering Governor Co. 374
Pittsburgh Boiler & Machine Co. .....
Pittsburgh-Des Moines Steel Co. 362
Pittsburgh Meter Co. 360
Pittsburgh Steel Products Co. 92-93
Pilbrico Jointless Firebrick Co. C-2
Plymouth Cordage Co. 296
Porter & Co. 39
Powell, William Co. .....
Power Mfg. Co. .....
Power Piping Co. C-30-C-31
Power Plant Equipment Co. .....
Power Specialty Co. .....
Prescott Co., The C-4-C-5
Prest-O-Lite Co., Inc., The 1
Pure Oil Co. 299
Pyle-National Co. .....

R

Ranney Oil Mining Co. 376
Ratigan, J. P., Co. .....
Reading Iron Co. 70
Reading Steel Casting Co., Inc. .....

R

Reed Roller Bit Co. 64
Regan Forge & Engineering Co. 21
Reid, Joseph, Gas Engine Co. C-120
Republic Flow Meters Co. .....
Republic Iron & Steel Co. 310
Republic Supply Co. .....
Rich, John L. 375
Ridge Tool Co. C-102
Ring, DeWitt T. 376
Ritter-Conley Co. 376
Robinson, A. .....
Robinson, James B. C-134
Roots, P. H. & F. M., Co. .....
Ross Heater & Mfg. Co., Inc. .....
Ross-Meehan Foundries .....
Ryerson, Joseph T., & Sons, Inc. 375

S

Safety Pulling Machine Co. 78
Sargent Engineering Corp., The .....
Schutte & Koerting Co. .....
Shaffer, J. E., Co. 334
Shaw, S. F. 373
Sharples Specialty Co. C-178
Sheehan Pipe Line Construction Co. ..C-124
Sheffield Steel Corp. 90
Sherwin-Williams Co. .....
Shippers' Car Line Corp. 320
Simplex Equipment Co. .....
Sinclair Refining Co. 349
Sivyer Steel Casting Co. .....
Skinner, M. B., Co. 373
Smith, A. O., Corp. .....
Smith Separator Co. 13
Sonner, P. J., Gas Burner Co. C-188
South Chester Tube Co. 316-317
Southern Cornice Works .....
Southern Mill & Mfg Co. C-123
Southwestern Engineering Corp. .....
Southwestern Engineering Co., Inc. ....
Spang & Co. 311
Spang, Chalfant & Co., Inc. 52
Spence Machine Co. .....
Spencer Trailer Co. .....
Stalder, Walter 375
Standard Engineering Co. 371
Standard Rail & Steel Co. C-169
Stanley Belting Corp. .....
Star Drilling Machine Co. .....
States Engineering Co., The 373
Stearns-Roger Mfg. Co. 91
Steiner, George 374
Stough Tank Erecting Co. C-182
Strom Steel Ball Co. .....
Sullivan Co., The .....
Sullivan Machinery Co. 313
Superior Tube Co. .....

T

Taubman Supply Corp. C-180-C-181
Templeton, Kenly & Co., Ltd. C-166
Texas Company, The 11
Thomas, C. R. 376
Timken Roller Bearing Co. .....
Titusville Forge Co. .....
Titusville Iron Works 76-77
Toledo Pipe Threading Machine Co. 319
Trimont Mfg. Co. .....
Trumble Gas Trap Co. .....
Truscon Steel Co. .....
Tulsa Iron Works Co. C-17
Tulsa Pipe & Supply Co., Inc. C-159
Tulsa Sheet Metal Co. 376
Twin Disc Clutch Co. .....

U

Union Machine Co. .....
United Alloy Steel Corp. .....
United Iron Works, Inc. 74
United States Cast Iron Pipe & Fdy. Co..373
United States Rubber Co. .....
Universal Oil Products Co. 43
U. S. Tool Co. .....

V

Van Couvering, M. 376
Victaulic Co. of America C-182
Vogt, Henry, Machine Co. 369
Vois Engineering Equipment Co. .....

W

Wailes Dove-Hermiston Corp. C-24
Wall Rope Works, Inc. .....
Walsh & Weidner Boiler Co. .....
Walworth Co. C-140-C-141
Ward Chemical Co. C-182
Warren Petroleum Co. 318
Waukesha Motor Co. .....
Welders Supply Co. C-166
Wescott & Greis C-118-C-119
Western Iron & Fdy Co. C-166
Western Machinery Co. 363
Western Supply Co. .....
Westinghouse Electric & Mfg. Co. .....
Wheatley Pipe Machine Works C-130
Wheeling Steel Corp. 302
White Company, The C-106-C-107
Wichita Falls Oxygen Co. C-134
Wickwire-Spencer Steel Co. .....
Wico Electric Co. .....
Widdell Engineering Co. .....
Williams, J. H., & Co. ..Inside Front Cover
Williamsport Development Co. 375
Williamsport Wire Rope Co. .....
Williams Bros., Inc. C-154
Williams Tool Corp. .....
Wilson, E. L., Hardware Co. C-33
Wilson Oil Tools Corp. .....
Wilson Welder & Metals Co. 18
W-K-M Company, Inc. C-80-C-81
Wood & Wood 375
Worthington Pump & Mach. Corp. 314
Wright Mfg. Co. 369

Y

Yale & Towne Mfg. Co. 321

Z

Zero Hour Torpedo Co. .....

WHAT AND WHERE TO BUY—PAGES 377-378-379

The OIL and GAS JOURNAL

PRODUCING REFINING MARKETING

VOL. 25. NO. 20. TULSA, OKLAHOMA, OCTOBER 7, 1926

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TABLE OF CONTENTS

SPECIAL ARTICLES

Seminole Big Factor in Whole Country 29
By Andrew M. Rowley
Oklahoma pool will be deciding element in readjustment of price structure. Present prices above average.

Co-operation, Not Coercion, Needed 31
By Phillip Kates
Compulsory oil legislation must respect basic rights of land owners. Police power depends on facts.

Recycling Aids Gasoline Plants 32
By Neil Williams
Installation of lifts to boost oil production also provides more wet gas for casinghead makers.

Modern American Refinery in Sumatra 33
By L. M. Fanning
Standard of New Jersey plant constructed under great difficulties; handicaps of jungle and transportation.

Limits Authority of Investigators 34
By Charles E. Kern
Decision on probing power of Federal Trade Commission of interest in present gasoline inquiry.

Bureau of Mines Figures for August 34

No Authority to Rummage (Editorial) 36

Technical Questions Answered 38
By Dr. C. K. Francis

September Field Work Slows Down 361

CRUDE OIL TRANSPORTATION IN AMERICA
All phases of pipeline construction and operation are covered in special articles appearing on pages 97 to 298 inclusive.

FIELD OPERATIONS

High Lights in Week's Operations 40
Shooting first well in Seminole Pool and extension of Upton County area, Texas, were features.

Late Fields 40

Texas Panhandle 41
By C. D. Lockwood

North Texas 42
By C. D. Lockwood

Oklahoma 45
By J. L. Dwyer

Mexico 45
By George Blardone

Canada 46
By Victor Lauriston

Kansas 46
By J. L. Dwyer

Louisiana-Arkansas 49
By James H. Dameron

Artesia, New Mexico 50
By Special Correspondent

Gulf Coast 53
By P. L. McGreal

Southwest Texas 54
By B. D. Stevenson

California 57
By L. P. Stockman

East Central Texas 58
By Special Correspondent

Rocky Mountain Area 58
By Frank B. Taylor

Pennsylvania-West Virginia 63
By D. S. Wakenight

Central West 65
By Whit

Kentucky-Tennessee 65
By Whit

Farmington, New Mexico 41
By Special Correspondent

REFINING AND MARKETING

Refined Markets Continue Inactive 30
By Neil Williams
Weather conditions during week prevent improvement in gasoline demand; inquiries for other products light.

Four State Jobbers Convention 32
By C. O. Willson

Gradual Easing Reported in Chicago 338
By J. B. Waldo

Large Consumption in East 339
By N. O. Fanning

Many Changes in Gasoline of Future 340
By Dr. Gustav Egloff
Certain specifications now considered important will be dropped, determined by engine performance.

Refining and Marketing News 342

Plant Operators' Page 344

Refinery and Crude Prices 346-347

Tankwagon Quotations 348

Measurement of Crankcase Dilution 358
By T. S. Sligh, Jr.
Recent perfections in capillary funnel method adds to accuracy and simplicity of tests.

ARTICLES OF GENERAL INTEREST

The Advertisers' Index 27

Men Known in Oildom and Personals 66

Equipment and Supplies 68

Natural Gas Developments 71

Demand on Pipe Mills Heavy 306
By B. E. V. Luty

Crude Output 12 Months Ending August 31 310
By James McIntyre

West Virginia Oil and Gas Association 314

Oil and Gas Consume 6 Per Cent of Steel Output 320
By B. E. V. Luty

Gulf Port Shipments in August 335

Classified Want Advertisements 336-337-339

Oil Securities Heavy During Week 350
By N. O. Fanning

Crude Storage in Texas 362

Recent Patents 364

Colombian Developments 368

What and Where to Buy 377-378-379

Crude Petroleum Statistics 380

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Refinery Section Starts on Page 338

Seminole Big Factor in Whole Country

Highest daily average estimated light oil production in 1925, week ended January 17, 1,525,220 bbls. Lowest in 1925, July 18, 1,374,173 bbls.

Oklahoma Pool Will Be Deciding Element in Readjustment of Price Structure. Present Prices Above Average

By Andrew M. Rowley

Highest daily average estimated production week ended May 30, 1925, 2,347,984 bbls. Lowest in 1925, January 3, 1,911,730 bbls.

With 25,000 barrels daily being withdrawn from crude oil storage in Oklahoma and Kansas, operators are of the opinion the crude oil price structure can be maintained during most, if not all, of this month at least—providing, of course, the Seminole Pool in Oklahoma does not show any big increase in output in the meantime. It is conceded the Seminole Pool is the factor which will decide when crude oil prices will be reduced in the Mid-Continent area and it is also believed when the reduction comes in the Mid-Continent, readjustments may be expected in other areas of the country.

On Tuesday of this week the Seminole Pool was producing 34,235 barrels daily and the pool had been extended half a mile north and half a mile west by the Mid-Continent Petroleum Corporation's well which flowed 117 barrels the first hour from the Wilcox sand. The first well to be shot in the pool increased its production from 30 barrels a day to 1,070 barrels for 15 hours, which is significant as it shows how the sand responds to a shot.

Production in Oklahoma probably will show another increase during this week and there are no indications declines may be expected elsewhere except in the Gulf Coast area where Spindletop recorded a substantial drop over the past week-end. That pool averaged 89,500 barrels daily last week but on Monday of this week produced 79,000 barrels. The completion of other good wells in that field, however, may hold up production there also. Operators in California anticipate a 20,000-barrel-a-day increase in production there within the comparatively near future which, taken in consideration with the weakness of the gasoline market, has a tendency to weaken the general price structure on the Pacific Coast.

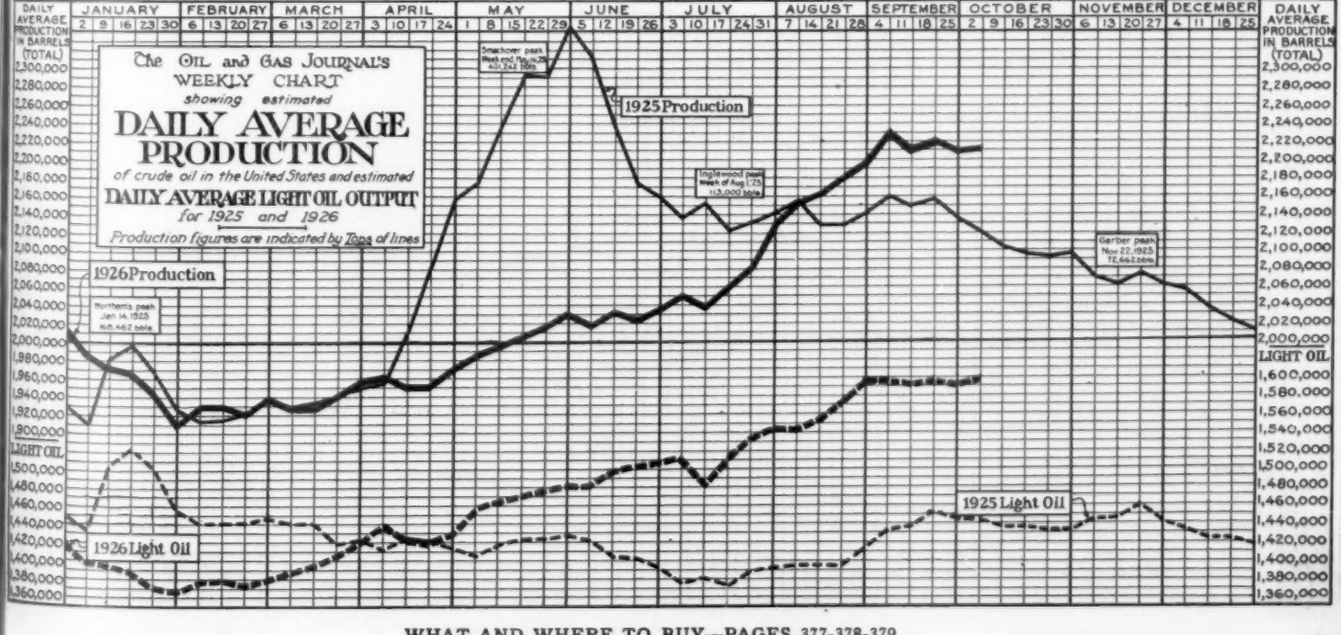
Crude oil prices throughout the country are higher now than they have been in any other October since 1920, which is a good indication of the prosperity of the industry and the big demand for crude oil this year. It is expected consumption this fall and winter will be the greatest in the history of the indusfry, consequently, while crude price reductions may be expected sometime within the near future, the general effect of such a readjustment has largely been discounted. Refiners are not curtailing their runs to any appreciable extent, indicating a continued good demand for crude.

PRODUCTION IN THE UNITED STATES

Estimated daily average production of light and heavy gravity crude oil in the United States for week ended October 2, and a comparison with the previous week follows:

	Oct. 2		Sept. 25	
	Light	Heavy	Light	Heavy
Oklahoma—				
Tonkawa	38,355	.....	37,900	.....
Burbank	46,665	.....	47,040	.....
Other Osage Fields	34,490	.....	34,280	.....
Cushing and Shamrock	21,460	.....	21,515	.....
Bristow and Eastern Bristow	27,315	.....	27,460	.....
Cromwell	15,305	.....	15,450	.....
Garber	26,590	.....	28,700	.....
Blackwell-Braman	23,195	.....	21,660	.....
Seminole	29,970	.....	23,940	.....
Wewoka	26,605	.....	28,150	.....
Northern Miscellaneous	115,150	.....	116,100	.....
Southern Fields	65,410	.....	65,550	.....
Total Oklahoma	470,510	.....	467,245	.....
North Louisiana	41,710	16,465	41,665	15,425
Arkansas—				
Smackover	14,225	118,610	14,540	119,430
Miscellaneous	18,455	.....	18,510	.....
Total Arkansas	32,680	118,610	33,050	119,430
North Central and West Texas	193,864	.....	191,750	.....
Texas Panhandle	125,135	.....	123,860	.....
Powell	26,750	.....	27,120	.....
Mexia, Currie, Richland	14,440	.....	14,780	.....
Nigger Creek	12,000	.....	13,200	.....
Wortham	6,025	.....	6,150	.....
Kansas	115,310	.....	114,020	.....
Total Mid-Continent Area	1,038,424	135,075	1,032,840	134,855
Gulf Coast	.....	184,580	.....	188,390
Southwest Texas	.....	45,465	.....	45,625
Eastern	110,000	.....	110,200	.....
Rocky Mountain Area	103,355	.....	104,150	.....
California—				
Santa Fe Springs	48,000	.....	48,500	.....
Long Beach	95,000	.....	95,000	.....
Huntington Beach	47,500	.....	47,000	.....
Torrance	5,000	22,000	5,000	22,000
Dominguez	23,000	.....	22,500	.....
Rosecrans	13,000	.....	13,000	.....
Inglewood	25,000	17,500	25,000	18,000
Ventura Avenue	50,000	.....	49,500	.....
Remainder of State	43,000	209,000	43,500	208,500
Total California	349,500	248,500	349,000	248,500
Total United States	1,601,279	613,620	1,595,690	617,370
Grand Total	2,214,899		2,213,560	

Total Increase, 1,339 Bbls.; Light Oil Increase, 5,589 Bbls.



WHAT AND WHERE TO BUY—PAGES 377-378-379

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Weather Conditions During Week Prevent Improvement in Gasoline Demand; Inquiries for Other Products Light

By Neil Williams

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The reductions were only in line with the steady downward trend of the last few weeks, and, although prices, especially of gasoline, reached a very low mark in respect to present crude postings, the market still did not give the appearance of what might be termed a "break."

On the other hand, there was a growing belief held by many that prices were near, if not already at, bottom, and that it would not take much to bring about a steadier, if not stronger tone. Several sellers expressed the opinion that they would hate to sell short at present moving prices.

This opinion was based on the theory that refinery prices already had discounted possible crude and tankwagon cuts and any improvement in demand would find immediate response in strengthening markets. In this connection, no matter what the opinion of crude producers or purchasers, refiners have ceased to expect a general Mid-Continent crude change soon. This may be more "hope so" than anything else but nevertheless there is a generally more optimistic feeling regarding the situation.

At present the market seems at a standstill pending weather developments only. Additional rains may mean a continuation of sluggish gasoline movements, but, if accompanied by cold, may increase requirements of fuel oil, gas oil and distillates. A stretch of clear weather and drying up of roads may bring at least a few more weeks of good motor consumption of gasoline before winter, but unless accompanied by cold, may mean further weakening of the heavier products. While weather conditions have been discussed always in connection with markets, they now seem the key to the situation more than any other time.

Considering this, sellers have been taking things as they come and have not been pushing the sale of their products to any great extent, realizing that the present low markets in reality have not been the result of a question of price on the part of buyers but rather because only a limited amount of petroleum products has been consumed and there has been but little demand at any price.

That the market has not experienced a real break is indicated in the fact that there have been no sharp declines, except in kerosenes, and the past week natural gasolines. The gradual reductions have reflected a very marked tendency on the part of sellers to resist price cutting, and the last few days there has been a more or less steadier tone than at any time in the last few weeks.

This is indicated in the fact that, although quotations are generally a quarter cent lower on gasolines, and 2½ cents on fuel oil than a week ago, prices, with few exceptions have been practically unchanged since Thursday or Friday. Several refiners reported that they received a very marked increase in inquiries both for gasoline and the heavier products Monday and Tuesday. This, however, was

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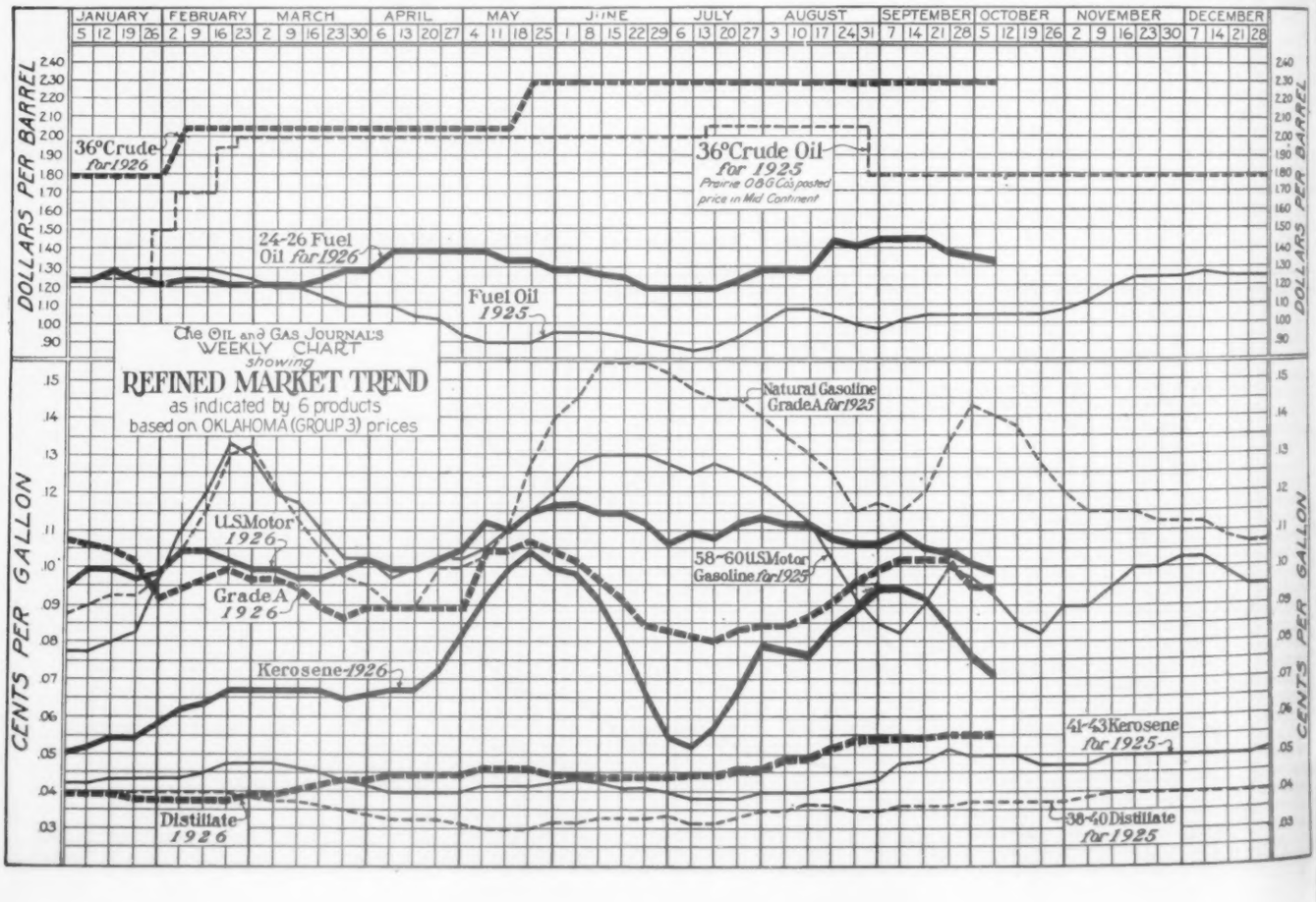

Co-operation, Not Coercion, Needed

Compulsory Oil Legislation Must Respect Basic Rights of Land Owners. Police Power Depends on Facts

By Phillip Kates*

The charge is made that the oil producing industry has developed and is operating under legal rules and practices that compel a wanton waste in our most important national asset, crude petroleum; and the recommendation is made by the Federal Oil Conservation Board, in its report to the President, that unless they are changed voluntarily, by agreement of the operators, the police power of the oil producing states be invoked to compel the operation of the fields in such a manner as not only to eliminate this waste but to secure a more equitable distribution of the oil produced among the various landowners above a common pool.

The creation of a Board of Inquiry to aid a basic industry in conserving a national asset, marks a decided step forward in the relation between Government and business. Probably no more important industrial investigation has been launched since the Royal Commission of 1901, for an inquiry into the coal resources of England. And the report of September 6, shows a distinct desire to aid; and indicates that the industry may count on support from the Government in working out its problems. The suggestion that co-operation among the units of the industry be substituted for ruinous competition is perhaps the most progressive feature of the report.

Police Power of States

But the suggestion that if co-operative methods of producing oil (in fact "the unit plan") are not adopted, that coercive laws, be passed under the police power of the oil producing states, is upon consideration, a disturbing note. For the inference is that unless done at once, the remedy may come too late, and obviously the acceptance of the new ideas by an industry as vast and as widely scattered as is the oil producing industry cannot come overnight. The process of time is as essential a factor as the soundness of the ideas advanced. Nor does the entire industry accept as sound the theory of unit operation. When eminent scientists disagree, the ordinary business man may well hesitate.

One statement in the report, that the nation theoretically faces only a six years' supply of oil, secured wide publicity, and may hasten the passage of ill-considered legislation. And the suggestion that the police power of the states be invoked to compel unit operation of the oil fields, may receive attention instead of the recommendation that opportunity for voluntary co-operative action be encouraged through the removal of restrictive laws. The suggestion for immediate coercive legislation is so contrary to the spirit of the report as to appear a most a foreign element, instead of an integral part of the report.

The statement that theoretically only a six years' supply is available, is also not in the spirit of the report. For that computation is based, not on the present competitive method of ownership, but on present pumping methods. And with improved methods, such as air recovery and water flooding, which are being perfected in the laboratories of the Government itself, a vastly increased recovery is in sight. Competent engineers estimate that under present methods, from one-tenth to one-fourth of the oil is taken from the sand. As over 9,000,000,000 barrels have already been produced, it will be seen that the oil remaining in the ground is a source of supply whose definitive amount becomes greater with new development. Its use awaits a key that will unlock the door; and while it may not be sound to count on full recovery of that oil, it is as unsound, in view of the progress being made, to say that American genius and ingenuity are unequal to the task.

Two Schools of Thought

If it has not been demonstrated that the vast deposits of oil in the exhausted fields are recoverable, neither has it been demonstrated to the satisfaction of all the scientific minds in the industry that the unit plan of operation of the fields would result in an increased recovery. There are two distinct schools of thought; which is correct, time and experiment will tell. There are legal obstacles in the way of co-operative work at this time. The removal of those obstacles would permit full opportunity for the voluntary working out of the plan.

But the idea that the nation faces a shortage of oil in a few years, unless steps are taken at once to conserve the supply; and the apparent approval by the board of the unit plan may cause our legislators to feel that coercive legislation must be passed at once. For as Mr. Doherty remarked in the open meeting of February 10, oil is our "great munition of war." Though with his further statement, that if war should come within the next few years our supply of petroleum would not be adequate some might disagree. Hasty legislation may sometimes be more disastrous than waiting.

The development of the iron trade in England in the seventeenth century necessitated the vast consumption of wood as fuel; for then smelting was done with charcoal. Wood was the "great munition of war" of Britain, for it was of the oak lumber of its forests that the ships of the line were built. And to England the navy meant life itself. Parliament seriously considered suppressing the iron trade altogether, and popular opinion was greatly aroused. "Many think," said a contemporary writer, "that there should be no works anywhere, they so devour the woods." Parliament did not suppress the iron trade; and one can but speculate on England's subsequent history if it had. The iron trade expanded, science and industry made practicable an invention that had slept for over 100 years; and in the middle of the eighteenth century coal was successfully applied to the smelting of iron in the Darby Mine at Coalbrook Dale. With the rise of the iron trade coal became the great munition of war; but the rapid advance of smelting threatened England with a shortage of coal. For only 60 per cent of the coal could be raised. The balance was left to support the roof of the mine. About the beginning of the nineteenth century timber struts were substituted and all of the coal could be removed. And with improvement of mining methods sufficient was available for all purposes.

Science to Aid

A few years ago, with the expansion of the automobile industry, the gasoline recovery from initial distillation indicated that our petroleum resources would not meet the then demand. But the perfection of cracking processes has doubled our supply from the same quantity of crude. And now the address of the president of the American Chemical Society, in the Golden Jubilee meeting of that society, delivered at the same time the report of the Oil Conservation Board was transmitted to the President, indicates that science has evolved uses for crude petroleum that will make the 50 per cent residue, now burned under boilers, more valuable by far than the portion converted into gasoline. The refineries of the future will be diversified manufacturing plants, unless some hampering program prevents. To one who is not a pessimist, we may almost feel that the petroleum industry is now in a similar stage to that of iron manufacture in England when Parliament considered suppressing it entirely, to preserve the oak trees of England. While it may be dangerous to rely only on the past for guidance, it is still more dangerous to disregard the practical lessons which experience teaches.

Though the history of modern science and industry gives us a reasonable expectation that the reserves left in the ground under present producing methods, will be commercially recoverable, that should not prevent the most exhaustive experimentation with newer methods suggested by engineers and geologists. If conservation of gas, by limiting initial flow means greater ultimate yield from newer wells, and if this necessitates the operation of oil fields as geologic units, instead of through competitive wells, we may be sure that demonstration of the fact will in some way result in the adoption of workable methods for such operation.

Compulsory Legislation

But compulsory legislation requiring this plan of operation can be justified only if it is founded on basic rights of the various land owners above the prospective fields, or if the national defense requires it because of some present emergency. One leader of the industry believes that the protection of the army, the navy and our prospective air fleet gives to the Federal Government the right and imposes on it the duty of immediately taking control of all the oil fields of the country. But with this suggestion the board evidently does not agree. From some source the board appears to have arrived at the idea that the common rights of the various owners of land above an oil or gas structure give to the states through the exercise of the police power the right to enforce a plan of co-operative drilling and operation. If that community of right does exist, the position of the board is tenable. If it does not exist, it is evident that the imposition of the plan through coercive legislation would be in fact an industrial revolution. Co-operative measures, adopted by voluntary agreement, if such agreement be legal and not in restraint of trade might secure the result sought, by the orderly processes of trade.

"Of the fundamental conservation measures above mentioned," says the board, "that of co-operative methods in development of new fields to prevent temporary gluts merits more exhaustive discussion, as it is a promising field for important action by both the industry and the Government." This suggestion is eminently sound and constructive, and if the power of the Government is bent to permitting such co-operative methods of operation there would be a real advance. But it is believed that its statement as to basic rights, and its recommendation for immediate legislation for the enforcement of such assumed rights, may result in confusion of thought and ill-considered laws.

State Coercion

"The common right," proceeds the board, "of adjoining owners to reduce to possession respective oil and gas in the pools tapped by wells drilled on their lands, should involve the recognition of correlated obligations, so that in the drawing of oil and gas by one owner from the common reservoir the producer should be required to recognize the right of the neighbor to so much of the oil as is withdrawn from underneath his property, less a reasonable allowance for the cost of production, the hazard of the undertaking and a reasonable profit on the undertaking. * * * The right of the state under its police powers to prevent the action of one owner from working a deprivation of the rights of other owners of a common property and to prevent waste or destruction of the common property by one of the owners, seems reasonably clear." * * * "In order to accomplish something in relieving the pressure of competition before it is too late, it is suggested that the lawyers familiar with the business of the oil operators take the lead in developing the needed line of action, in accord with the discoveries of science and changes in engineering practice." * * * "State legislation for the protection of all owners would be preferable, and the Federal authority, if any, should be invoked only when it is clear that the state is unwilling or fails to act, or when the naval reserves are threatened with depletion."

The program obviously calls for immediate state legislation providing for coercive measures based on a theory of community ownership of the fields; for voluntary co-operative systems by agreement of diverse owners; calls for no exercise of the police power of the states, but only the repeal of restrictive legislation.

It is obvious from the most cursory study of the law that the police power of the states may, and should be exercised to prevent waste and the destruction of an oil or gas field by one of the owners, for the preservation of the rights of the public and

(Continued on Page 325)

*Sixth of a series of articles by a Tulsa attorney who has made a study of the petroleum industry.

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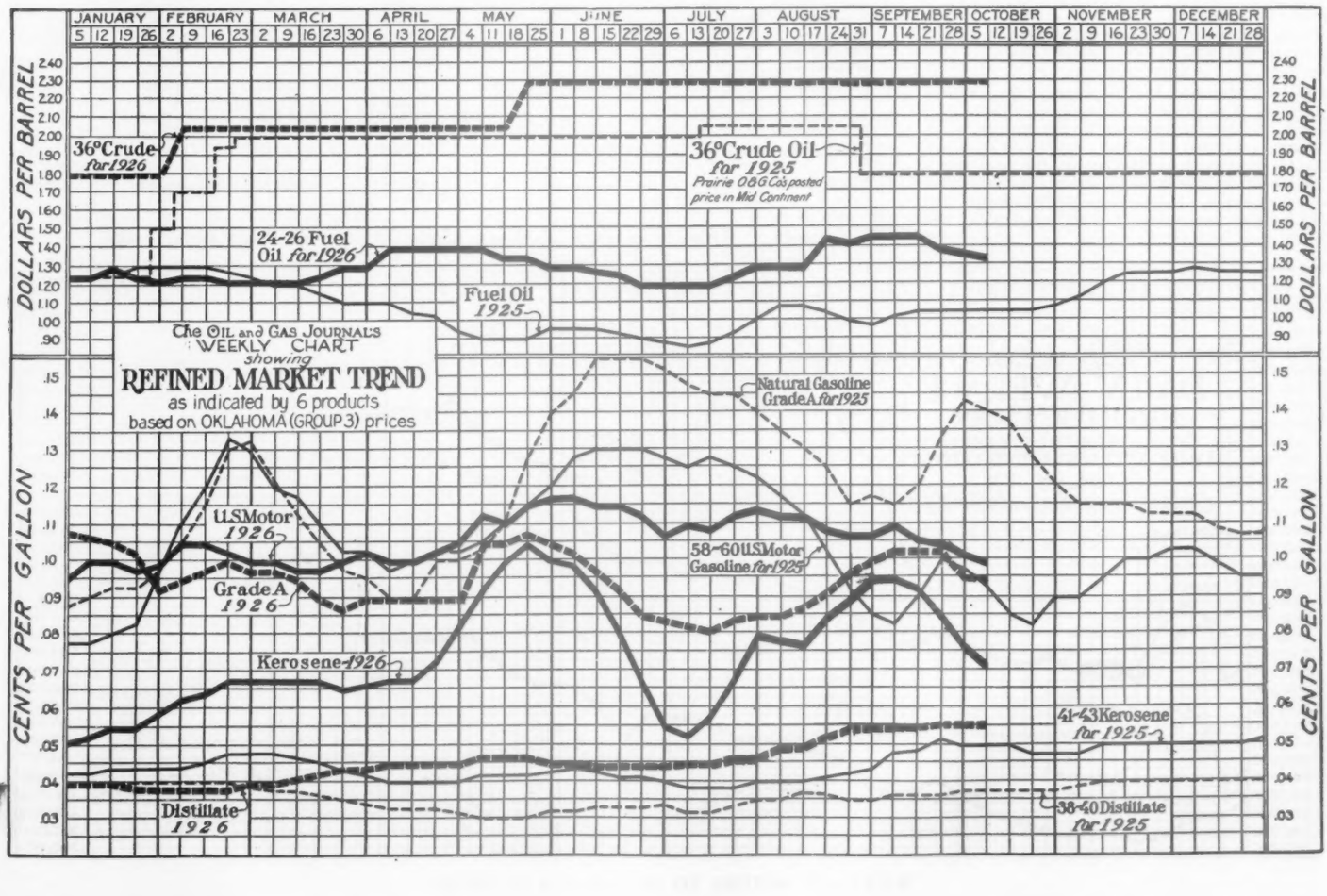
JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER
DOLLARS PER BARREL
36°Crude for 1926
24-26 Fuel Oil for 1926
Fuel Oil 1925
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Prairie O&G Co's posted price in Mid Continent
The Oil and Gas Journal's WEEKLY CHART showing
REFINED MARKET TREND
as indicated by 6 products
based on OKLAHOMA (GROUP 3) prices
CENTS PER GALLON
U.S.Motor 1926
Grade A 1926
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Distillate 1926
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"Of the fundamental conservation measures above mentioned," says the board, "that of co-operative methods in development of new fields to prevent temporary gluts merits more exhaustive discussion, as it is a promising field for important action by both the industry and the Government." This suggestion is eminently sound and constructive, and if the power of the Government is bent to permitting such co-operative methods of operation there would be a real advance. But it is believed that its statement as to basic rights, and its recommendation for immediate legislation for the enforcement of such assumed rights, may result in confusion of thought and ill-considered laws.

State Coercion

"The common right," proceeds the board, "of adjoining owners to reduce to possession respective oil and gas in the pools tapped by wells drilled on their lands, should involve the recognition of correlated obligations, so that in the drawing of oil and gas by one owner from the common reservoir the producer should be required to recognize the right of the neighbor to so much of the oil as is withdrawn from underneath his property, less a reasonable allowance for the cost of production, the hazard of the undertaking and a reasonable profit on the undertaking. * * * The right of the state under its police powers to prevent the action of one owner from working a deprivation of the rights of other owners of a common property and to prevent waste or destruction of the common property by one of the owners, seems reasonably clear." * * * "In order to accomplish something in relieving the pressure of competition before it is too late, it is suggested that the lawyers familiar with the business of the oil operators take the lead in developing the needed line of action, in accord with the discoveries of science and changes in engineering practice." * * * "State legislation for the protection of all owners would be preferable, and the Federal authority, if any, should be invoked only when it is clear that the state is unwilling or fails to act, or when the naval reserves are threatened with depletion."

The program obviously calls for immediate state legislation providing for coercive measures based on a theory of community ownership of the fields; for voluntary co-operative systems by agreement of diverse owners; calls for no exercise of the police power of the states, but only the repeal of restrictive legislation.

It is obvious from the most cursory study of the law that the police power of the states may, and should be exercised to prevent waste and the destruction of an oil or gas field by one of the owners, for the preservation of the rights of the public and

(Continued on Page 325)

*Sixth of a series of articles by a Tulsa attorney who has made a study of the petroleum industry.

Recycling Aids Gasoline Plants

Installation of "Lifts" to Boost Oil Production Also Provides More Wet Gas for Casinghead Makers

By Neil Williams

Of prime interest to manufacturers of natural gasoline have been developments in recycling of residue gas. This comparatively new procedure has passed the experimental stage and is a vital adjunct in the operations of some of the larger companies.

The principle has not been used practically long enough that all its possibilities and various details of manipulation might be determined but the work already done with the process has demonstrated it is one of the most revolutionary steps ever taken in the natural gasoline industry.

Recycling of residue gas from a gasoline manufacturer's standpoint really is secondary to the original purpose of reviving old wells which have declined in oil production but the results in making more wet gas available for plant operations and in boosting gasoline yields have been more than favorable.

Very accurate records have been kept of the operations of one plant in particular in Osage County. In the 12 months immediately following the starting of the residue gas recycling the gasoline production of the plant was increased 26.9 per cent over what it was before. This was due to a 47.6 per cent boost in the gas output of the lease on which the plant is located.

This plant has a rated capacity of only 2,800 to 3,000 gallons daily based on the gasoline content of the gas produced in that area but the residue gas was sufficient to increase the oil production of the 12 wells on the lease 39.7 per cent, in addition to the greater gas flow mentioned in the preceding paragraph.

The general principle or theory of recycling lies in forcing the lean residue gas from gasoline plants down into the oil sand, where it, under artificial pressure, drives up the oil and gas already there and in turn becomes saturated with gasoline through contact with the crude and comes out a wet gas to be run through the plant again.

Initiated by Oil Producers

The idea of recycling residue gas is a product from the minds of oil producers, who for many years have been interested in increasing their production and reviving their wells by forcing the oil and gas from the sand by pressure.

Producers, especially in the older fields, have put compressed air to good use by putting the air down a well in the center of a group, thus driving the oil and gas through the sand and out the adjoining wells. Only recently has gas been used and its adaptation by some of the pioneers came as a result of experiments in means of storing surplus gas.

One large company in particular developed the principle of recycling through necessity of having to work out a problem of storing some surplus gas which it had on one of its leases in Osage County. In the autumn of 1924 this company was faced with a shortage of gas and was forced to change from gas engines to oil engines to carry on its operations. But, when the following spring came and more gas became available due to the warmer weather, the operator of this lease, having changed to oil engines, had considerable surplus gas.

A question then arose as to the storage of this surplus gas to be used the following winter. Suggestions were made such as building of a gasometer, and other ways, but it finally was decided to experiment with putting the gas back into the sand. This was done, the gas being pumped down the gas hole of one of the old wells.

This storage of gas in sand brought such apparent results that the operation has been continued since. When the wells were opened there was a favorable increase in both oil and gas production and in gasoline yield. The load factor at the company's gasoline plant increased approximately to the limit of the equipment. Before the scheme was started a greater part of the equipment was idle. That which was running carried 5-inch vacuum on suction of compressors but since then all units are in operation with atmospheric condition at suction.

Developed by oil operators, the actual operation of recycling the residue gas still is in the hands of the producing end of the oil business. The residue gas to the producers is just a means of boosting their production. They take the gas from the plants, run it through their own compressors and force it down the wells and then turn the flow from the wells into their separators, where the oil is taken off and the saturated gas piped to the gasoline plants the same as from any well not on the recycling system. Operation of the plants and the equipment are not different than at other plants.

TABLE SHOWING RESULTS OF RECYCLING RESIDUE GAS ON ONE LEASE*

1925—	Production Oil (Bbls.)	Production Gas (M. Ft.)	Gas Oil Ratio (Ft.-Bbls.)	Gasoline Production (Gals.)	Gasoline Production (Gals.M.Ft.)	Gas to Sand (M. Ft.)	Net Return (M. Ft.)
January	5,530	14,900	2,700	43,600	2.92		
February	5,466	13,650	2,500	40,800	2.99		
March	6,152	14,650	2,380	52,600	3.59		
April	5,537	14,300	2,590	47,600	3.33	319	13,981
May	6,445	14,760	2,290	55,800	3.78	7,700	7,060
June	6,676	16,420	2,460	54,700	3.33	9,800	6,620
July	7,104	16,000	2,255	56,900	3.56	10,100	5,900
August	7,298	14,920	2,050	56,900	3.82	9,800	5,100
September	6,681	21,800	3,260	53,603	2.48	9,500	12,300
October	7,052	21,670	3,080	60,400	2.79	7,900	13,770
November	6,985	22,050	3,176	61,700	2.79	10,200	11,850
December	7,276	21,820	3,000	59,100	2.71	11,200	10,620
1926—							
January	7,838	23,800	3,040	56,100	2.36	10,200	13,600
February	7,959	24,950	3,140	55,600	2.23	8,400	16,550
March	9,201	26,395	2,865	64,677	2.44	10,500	15,895
April	9,316	27,322	2,935	63,092	2.31	11,500	15,822

*Note: Pressure and residue gas applied on April 27, 1925. Production from 11 wells.

Aids Gasoline Manufacturers

Natural gasoline manufacturers, however, are interested in the process in view of the results which have been obtained. It probably means greater expansion of the industry, longer life for the equipment and generally more profitable operations. From a gasoline manufacturer's standpoint, recycling renews and revives the gas supply in which the gas has dwindled to such an extent that plants could not operate to a profitable capacity, if at all, and prolongs operations as long as there is any gas and oil left in the sand.

On one lease in the Tonkawa Field, the gas increased to such an extent, as a result of recycling of residue gas from a plant operated by the Comar Gasoline Co., that the company was able to install another plant to run on only the recycled gas. This new plant is a portable of the Southwestern type.

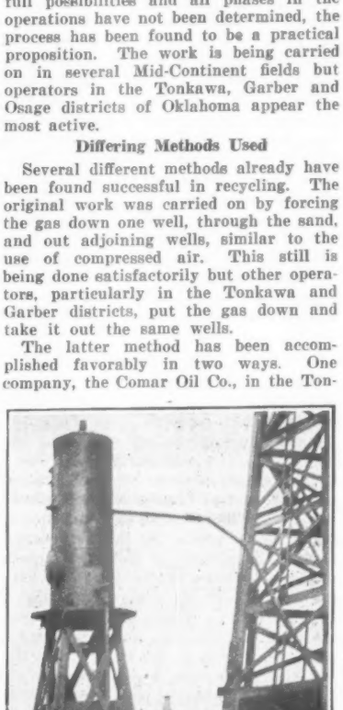
At this location the seven wells which were connected in the recycling system had dwindled in gas production to a few hundred thousand feet of gas daily, not sufficient to run a plant, but now are making around 9,000,000 to 10,000,000 feet which insures operation of the portable.

Although, as previously explained, the full possibilities and all phases in the operations have not been determined, the process has been found to be a practical proposition. The work is being carried on in several Mid-Continent fields but operators in the Tonkawa, Garber and Osage districts of Oklahoma appear the most active.

Differing Methods Used

Several different methods already have been found successful in recycling. The original work was carried on by forcing the gas down one well, through the sand, and out adjoining wells, similar to the use of compressed air. This still is being done satisfactorily but other operators, particularly in the Tonkawa and Garber districts, put the gas down and take it out the same wells.

The latter method has been accomplished favorably in two ways. One company, the Comar Oil Co., in the Tonkawa district, has found it expedient to pump the residue gas down the tubing and out between the casing and the tubing. However, this can be reversed and the gas put down the casing and out the tubing.



One of the separators, or gas traps, used in the recycling process in the Tonkawa Field.

Roxana Petroleum Corp. has been one of the leaders in recycling, so a brief description of some of the operations at Tonkawa of the Comar Oil Co. and the Comar Gasoline Co., which are owned jointly by Roxana and the Marland interests, might give a general idea of the process. The Comar Oil Co. controls the production end and consequently the recycling operations while the Comar Gasoline Co. owns the plants which furnish the residue gas and take the recycled gas.

The Comar Oil Co. at present has seven wells operated by residue gas pumped into the holes by compressors, known in the process as gas lifts. These wells are all in the northwestern part of the Tonkawa Field and are in the deep sand from 4,000 to 4,200 feet.

The Comar Gasoline Co.'s portable plant which operates on the gas recycled from these wells is in this district but the residue gas which is forced into these wells is pumped a distance of be-

(Continued on Page 328)

FOUR STATE JOBBERS CONVENTION DECIDES TO HOLD ANNUAL SESSIONS

By C. O. Willson

KANSAS CITY, Mo., Oct. 1.—The big Four State Convention of oil jobbers, which closed a two-day session here this week, will be an annual affair, according to officers of state associations which participated in the joint meeting. The announcement apparently found favor with the membership of the Missouri, Kansas, Iowa and Nebraska associations who combined to make possible the convention here.

The large attendance and the general success of the meeting held accounts for the decision to make the convention an annual affair. Approximately 400 jobbers, refiners and representatives of supply companies registered, a record which compares favorably with the attendance at many national meetings of jobbers which have been held in the past year. The meeting was held this year due to a belief that the problems of the jobbers of the four adjoining states were largely mutual with much benefit to accrue to the membership through joint discussions. The officers of the individual state associations, which will continue to function as before, believe that the success of this year' meeting assures support for all future conventions.

The discussions which took place at the business sessions were concerned with developments in the manufacture and distribution of motor fuels and the evil of substitution in the marketing of lubricating oils. The addresses of Dr. Roy Cross of the Kansas City Testing Laboratory, (read by Dr. Walter Cross in the absence of the author who was unable to be present) and Dr. Gustav Egloff of the Universal Oil Products Co., were heard with great interest. Many questions were asked the two speakers whose organizations have a prominent part in developing the modern motor fuel.

OTHER FEATURES OF CONVENTION PROGRAM

The first day's proceedings at the Four State Jobbers' Convention at Kansas City, Mo., September 28-29, including the address of Dr. Roy Cross, were published in The Oil and Gas Journal of last week. Doctor Egloff's address will be found on page 340 of this issue.

No Gasoline Shortage

In reply to inquiries from the floor both speakers expressed confidence in regard to adequate supply of motor fuel for the future. Both emphasized the importance of cracking in adding to the available motor fuel supply from present crude supplies and pointed out that in the future gasoline would more and more be a blend of the cracked product with straightrun gasoline.

In the event the crude supply proves inadequate for future needs both speakers pointed out that coal distillation and shale deposits offered an almost unlimited supply. Both speakers were inclined to

(Continued on Page 341)

Modern American Refinery in Sumatra

Standard (N. J.) Plant Constructed Under Great Handicaps of Jungles and Transportation Difficulties

By L. M. Fanning
New York Bureau, The Oil and Gas Journal, Room 543, 30 Church St., New York City

Rapidly nearing completion, the refinery of the Nederlandsche Koloniale Petroleum Maatschappij, subsidiary of the Standard Oil Co. of New Jersey, near Palembang, Sumatra, Dutch East Indies, probably represents a new record in construction under almost insuperable difficulties as to jungle terrain as well as those in connection with the transporting of materials 12,000 miles from their source of manufacture. The construction of the refinery and the attendant housing and recreation facilities for the employes will have been accomplished under extremely difficult conditions in the relatively short time of approximately 18 months.

The refinery is located in the southeastern part of the Island of Sumatra on the Moesi River, about 6 miles below the city of Palembang at Soengei Gerong. Palembang is the capital of the Residency of the same name, and has a otal population of over 70,000, of which but a little over 1,000 are Europeans. Excepting Palembang, the nearest cities are Singapore, 300 miles away, and Batavia, 350 miles distant.

This region in which the refinery is located is the least developed in the island and includes the territory of the Moesi system, which drains approximately 48,000 square miles. The Moesi River is navigable for fairly large vessls up as far as Palembang, and will be used for the transportation of products from the refinery.

Complete Modern Refinery

Soengei Gerong, the refinery site, is 45 miles up the Moesi River from the China Sea, and 6 miles below the city of Palembang. An area of 100 acres was secured at this place at the junction of the Pladjoe and Moesi Rivers, surrounded on the remaining sides by jungle. At this site has been erected a complete refinery with crude stills, cracking coils, re-run and reducing stills with all attendant equipment, including the necessary storage and working tankage.

A modern boiler and power plant with steam and electrical distribution lines, water pumping equipment, and even housing and recreation facilities for employes have been provided. Special equipment using liquid sulphur dioxide has been installed for finishing high-grade refined oils. In addition to this type of treating equipment, a manufacturing plant for supplying the necessary liquid sulphur dioxide has been provided.

A complete fire protection system has been installed, providing for the use of water, steam or foam. The plant is complete and modern in every respect, all structures being of fireproof construction; the buildings being, in most cases, of steel framework with corrugated metal roofs and side walls. In view of the isolated position of the refinery, a hospital is provided with company doctor and attendants. All refinery equipment was fabricated at the work of the Standard Oil Co. of New Jersey at Bayway, N. J., and shipped to Sumatra.

The erection of this complete refinery in an actual jungle 12,000 miles from the home office, presented many special difficulties not ordinarily encountered in construction work. The site had first to be cleared of jungle growth and filled to a depth of 5 feet to bring it above flood water level, as all the land along the Moesi is low lying, flat and swampy, and under water when the Moesi is in flood, which usually occurs once each year. A hydraulic dredge was used for making the fill, taking the sand from the river. A total of 600,000 cubic yards were moved in this manner.

In order to retain the fill and protect the refinery from the wash of the rivers, a concrete sheet piling bulkhead with anchor piles was constructed along the water front of the Moesi and Pladjoe Rivers for a distance of 3,000 feet. As the Moesi provides the only means of transportation for labor and materials, it was necessary to provide, as soon as possible, a wharf which could be used by vessels during the construction period, as well as by the tanker handling the output of the refinery later. The wharf is constructed of concrete piles with a flooring of iron-wood, and provided with a gantry crane and narrow-gauge railway connecting with lines laid to various parts of the site to facilitate the distribution of construction material.

Due to the nature of the soil, it was found that piling would be necessary under all foundations, excepting the housing for employes. Reinforced concrete piles were used, and the casting and driving of the large number required was alone a work of no small magnitude.

The engineering work in connection with the design of this plant and purchase of materials were done in New York, and due to the great distance from the refinery, it was necessary, in order that no delays occur in erection, that careful checking be made of all designs and that all materials be inspected before shipment so that they might be of satisfactory quality and correspond to the plans. An inestimable amount of time and money was saved by the use of radio in transmitting information between the refinery and headquarters at New York, as questions having regard to policy design, etc., that could not have been foreseen were bound to arise.

The location of the refinery made necessary the housing of all construction forces on the site. Native labor, consisting of Chinese, Japanese and Malays, was the only kind available and was housed in the temporary buildings made of bamboo frames with thatched roofs and sides. The white supervisory force was originally housed in Palembang, being transported to and from the refinery site in motor boats. However, as soon as suitable structures could be erected at the refinery, the men were moved there.

The supervisory force, consisting of a construction superintendent, engineers and mechanical foreman, formed the skeleton construction organization and supervised the native workers. Due to the difficulty of securing and handling native labor, some of the work was let out on contract, but due to the natives being unfamiliar with modern construction equipment, such as tractors, tractor cranes, pneumatic hammers, welding equipment, etc., it was necessary that a considerable amount of time be spent in instructing them in the use of this type of equipment.

In view of the inefficiency of labor in this part of the country, as much labor-saving equipment was used in the construction as was possible, and early shipments of materials contained this type of equipment, which proved very effective, the superintendent of construction advising that one tractor was equivalent to at least 40 native laborers. All tractors, tractor cranes, etc., were of the caterpillar type, on account of the sandy nature of the soil.

Attractive Residences

In order to eliminate a considerable amount of time lost in transporting the

(Continued on Page 330)

PALEMBANG PLANT NOW IN OPERATION

NEW YORK, Oct. 2.—Standard Oil Co. of New Jersey today starts operating the first refinery it has ever had in the Dutch East Indies. The new plant is at Palembang, Sumatra, and can handle 5,000 bbls. daily. Products will be marketed through the Dutch East India islands and the Far East.

The New Jersey company has developed a production of about 8,000 bbls. of crude oil daily in Sumatra on lands obtained in a concession several years ago from the Dutch East India Government. It has also completed and placed in operation a 6-inch pipeline about 80 miles long connecting the producing properties with the refinery. Although the line is not very long, its construction is regarded as one of the most remarkable feats of oil field engineering, due to unusual topographical, labor and other conditions encountered.

Successful completion of the various facilities is an important step for Standard Oil, as it represents the first time any company except Royal Dutch has been able to get a real foothold in the Dutch East Indies producing and refining situation. This is the only refinery erected by an American oil company in the whole of the Far East, and oil marketed there has been shipped thousands of miles, mainly from the Pacific Coast. The new operation will not, of course, take care of all of New Jersey's requirements, but it is a step toward putting it on a better competitive footing with Royal Dutch in those markets.

Left to right, superintendent's house, assistant superintendent's house, the Clubhouse and two dwelling houses; Moesi Avenue and Fourth Street. The buildings are of domestic brick and stucco, with white and red tile roofs, the trim painted a dark gray.

Crude storage tank with field and suction lines attached. The scaffolding is of bamboo.

Limits Authority of Investigators

Decision on Probing Power of Federal Trade Commission of Interest in Present Gasoline Inquiry

By Charles E. Kern
Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Oct. 2.—The privacy of business and the extent to which the courts may go in compelling corporations to divulge information are the subject of an opinion handed down in the Supreme Court of the District of Columbia, holding that Millers' National Federation of Chicago, Ill., is entitled to an injunction restraining the Federal Trade Commission from executing subpoenas directed to the federation calling for the production of its books and records. The commission had sought to inspect the records in connection with its investigation of the milling and baking industry of the country. The decision is of timely interest to the oil industry now undergoing another investigation by the Federal Trade Commission.

This investigation was ordered by a resolution of the Senate in the Sixty-eighth Congress. The subpoenas were issued last spring and the federation and its officers thereupon filed petitions with the Supreme Court of the District of Columbia to enjoin the commission from executing them. Associate Judge James F. Smith, in delivering the opinion, reviewed the law under which the Federal Trade Commission is operating. He analyzed each section that could be cited as providing authority for such investigations or limiting its scope.

Text of Opinion

"No complaint," he said, "was issued or served by the commission on the plaintiffs, charging them with unfair competition and it is patent that the investigation which the commission is seeking to prosecute is not within the scope of Section 9 and is excluded from the provisions and operations thereof. The investigation sought to be practiced by the commission in this case was administrative and was admittedly directed by a resolution of the Senate. The right and authority of the commission to make the investigation is found in Section 6 and particularly in paragraph (d). The Senate resolution did not authorize the investigation of the Millers' National Federation or of any particular corporation or business concern. It simply directed the Federal Trade Commission to investigate the production, distribution, transportation and sale of flour, bread and by-products and to report its findings in full to the Senate, showing costs, prices and profits at each stage of the process of production and distribution from the time the wheat left the farm until the bread was delivered to the consumer.

"The resolution made no charges against any business concern, but required the commission to investigate the extent and methods of price fixing, maintenance, price discrimination and any acts making for monopoly or concentration of control of the milling or baking industries, as well as all evidence indicating the existence of agreements or conspiracies or combinations in restraint of trade. The resolution did not authorize the commission to issue subpoenas or to compel the production of documents or papers and it is unthinkable that the Senate ever intended to clothe the commission with power to compel the attendance at Chicago of witnesses from every part of the United States and to force firms, partnerships and corporations in the milling, baking and allied industries to submit their books and papers to the representatives of the commission at the time and place designated by the subpoenas.

Commission's Power Limited

"No committee of Congress appointed to make an investigation has any power to compel the attendance of witnesses or the submission of documents or papers unless the committee is so authorized by one or both Houses and certainly the Federal Trade Commission has no greater power in that behalf under the resolution than would a committee of the Senate similarly situated. Indeed, if the Senate had authorized the commission to issue process to secure the attendance of witnesses and the production of books, documents and papers, such action would have been beyond the Senate's jurisdiction in as much as no administrative officer of the Government can be vested with such powers without the joint action of both Houses and then only within the limits prescribed by the Constitution. Subordinate administrative agencies of the Government have no powers save those granted by law or necessarily implied from those so granted and the right to legislate is vested by the Constitution in Congress and not in the Senate or the House.

"The investigation under consideration was initiated by the commission under and because of the Senate resolution, but even if it were prosecuted under Section 6, that section prescribes in definite and express terms what investigations the commission may make on its own initiative and the means it may employ to make them. It may require of certain corporations either annual or special reports and answers to specific questions concerning matters in the section precisely described, mentioned and named. That definite prescription of what the commission may do is exclusive and from it no power can be implied to issue subpoenas or to compel business men or their employes to submit themselves, their letters, business papers, documents, and books to examination by the commission at any time and at any place in the United States, designated in the subpoena.

Law Quoted

"Section 9, of the Act does authorize the commission to issue subpoenas requiring the attendance and testimony of witnesses and the production of documentary evidence. The attendance and testimony of witnesses and the production of documentary evidence necessarily contemplates a judicial or quasi-judicial proceeding the formal hearing of some matter at issue between definite parties and no such hearing or proceeding is provided for in Section 6, it is evident that the power to issue subpoenas commanding the attendance and testimony of witnesses and the production of documentary evidence has no application to that section. Section 5 does provide for a hearing of charges made by formal complaint of the commission against any person, partnership or corporation and authorizes the making of findings of fact and the issuance of an order to the parties cited to desist from unlawful practices. The provision of Section 9, under discussion, is therefore applicable to the quasi-judicial proceeding provided for in Section 5, but it cannot be made available for the investigations authorized by Section 6. To hold otherwise would permit the commission to fish for facts which would justify the filing of a complaint under Section 5 and thereby allow a discovery which could not be achieved even by a bill in equity.

"If matters of business privacy be material and relevant evidence for the protection of the public or for the determination of the rights of interested parties, a legally constituted tribunal or body duly authorized to consider the evidence afforded by such matters in a proper proceeding, may in the manner and as prescribed by law, compel their disclosure. But no mere administrative agency of the Government acting as such, has any right to invade the privacy of business except as prescribed by law and then only within Constitutional limitations. Indeed, so far as natural persons or private organizations are concerned it is certain that Congress can not give administrative officials authority to rummage through their papers without their consent in the hope that evidence may be discovered for a public purpose. The rights of a corporation against unlawful search and seizure are to be protected even if the same result might have been achieved in a lawful way.

Without Authority

"Section 9 authorized the commission and its agents to examine at all reasonable times and to copy documentary evidence of any corporation under investigation or proceeded against, but the commission has no power to issue or serve subpoenas or to compel witnesses to attend or testify or to exact the production of documentary evidences until it has proceeded against the corporation by taking the action set out in Section 5.

"Subdivision (a) of Section 6 does not authorize the commission to investigate persons or partnerships. Its right to investigate thereunder is limited thereby to corporations which are not banks or common carriers and its activities as an investigating body are further limited, by the Constitution, to corporations engaged in interstate commerce.

"The Millers' National Federation, A. P. Husband and Carl R. Sims, are not corporations as defined by the Act and the right to investigate them or any of them is not conferred on the commission by Section 6.

"The Sims Milling Co. is a corporation engaged in Indiana in the manufacturing of wheat flour and other products, which are sold in both intrastate and interstate commerce and it may be that the commission has a right to exact under subdivision (a) of Section 6, the reports and answers therein specified, but it has no right whatever to compel the attendance of witnesses and the production of documentary evidence until it has filed the complaint provided in Section 5 against the Sims Milling Co. concerning its interstate business.

"We now come to the consideration of whether the plaintiffs have the plain, adequate and complete remedy at law which bars their rights to relief in equity.

Right to Equity

"The bill alleges and it is not denied, that the secretary-treasurer of the Millers' National Federation is required by the subpoena duces tecum to produce and submit to the representative of the commission first the memorandum or minutes of agreements, discussions or decisions of members of the Millers' National Federation and others at 21 group meetings held in various specified cities and states in the United States; second, the originals or carbon copies of nearly 450 letters

(Continued on Page 89)

CRUDE PRODUCTION IN AUGUST LESS THAN ONE YEAR AGO

By G. R. Hopkins
Petroleum Economist

The production of crude petroleum in the United States during the month of August, 1926, as compiled from pipeline runs reported to the Bureau of Mines, Department of Commerce, amounted to 66,525,000 bbls., a daily average of 2,146,000 bbls. This represents an increase of 2.5 per cent over the preceding month, but is a decrease from a year ago of 1.6 per cent.

As was the case in July, increased developments in the Panhandle and Spindletop Fields were responsible for the increased production. The production of Texas during August nearly equaled its record figure established in the latter part of 1923 when the Powell Field was at its height.

Imports of crude petroleum during August, 1926, were 5,332,000 bbls., over 500,000 bbls. of which were from Colombia and over 1,000,000 bbls. from Venezuela.

During August there were 1,924 producing oil wells completed as against 1,861 in July. This constitutes the highest figure for producers completed in one month since 1920.

Total stocks of crude petroleum were again reduced. Stocks at refineries and stocks of heavy crude petroleum in California were slightly increased, but tank farm and pipeline stocks east of California decreased nearly 1,750,000 bbls. These stocks on August 31, 1926, amounted to 276,448,000 bbls.

Refined Products

Total runs to stills of crude petroleum during August, 1926, amounted to 67,693,000 bbls., of which 4,158,000 bbls. was foreign crude petroleum. This represents a slight increase in total runs over July and a 1 per cent increase over a year ago. That the present trend is toward a greater dependence on foreign sources of supply for uses other than for fuel is illustrated by the fact that runs to stills of foreign crude petroleum during August, 1926, were a 52 per cent increase over the preceding year, whereas runs of domestic crude petroleum decreased.

Gasoline production and consumption continued to establish record figures. Production amounted to 25,416,000 bbls., a daily average of 820,000 bbls., which represents an increase of 2 per cent over July and of 9.6 per cent over August, 1925. Percentage recovery and per cent of the total gasoline attributable to cracking 37.5 and 32.0 per cent, respectively. At the current rate of demand these gasoline stocks represented 36 days supply as compared to 43 days supply on hand the previous month and to 44 days supply on hand August 31, 1925. Domestic demand amounted to 26,282,000 bbls., a daily average of 848,000 bbls. This represents an increase over July of 9 per cent and over August, 1925, of 18 per cent. Perhaps the outstanding event of the month in gasoline statistics was the 10 per cent decrease in stocks, which is high even for the month of August. Stocks of gasoline on hand August 31, 1926, amounted to 34,551,000 bbls. as compared to 38,315,000 bbls. on hand the previous month and to 36,236,000 bbls. on hand August 31, 1925. This was the first time since 1920 that August gasoline stocks were lower than the corresponding stocks for the preceding year.

The domestic consumption of lubricants set a record figure—the total of

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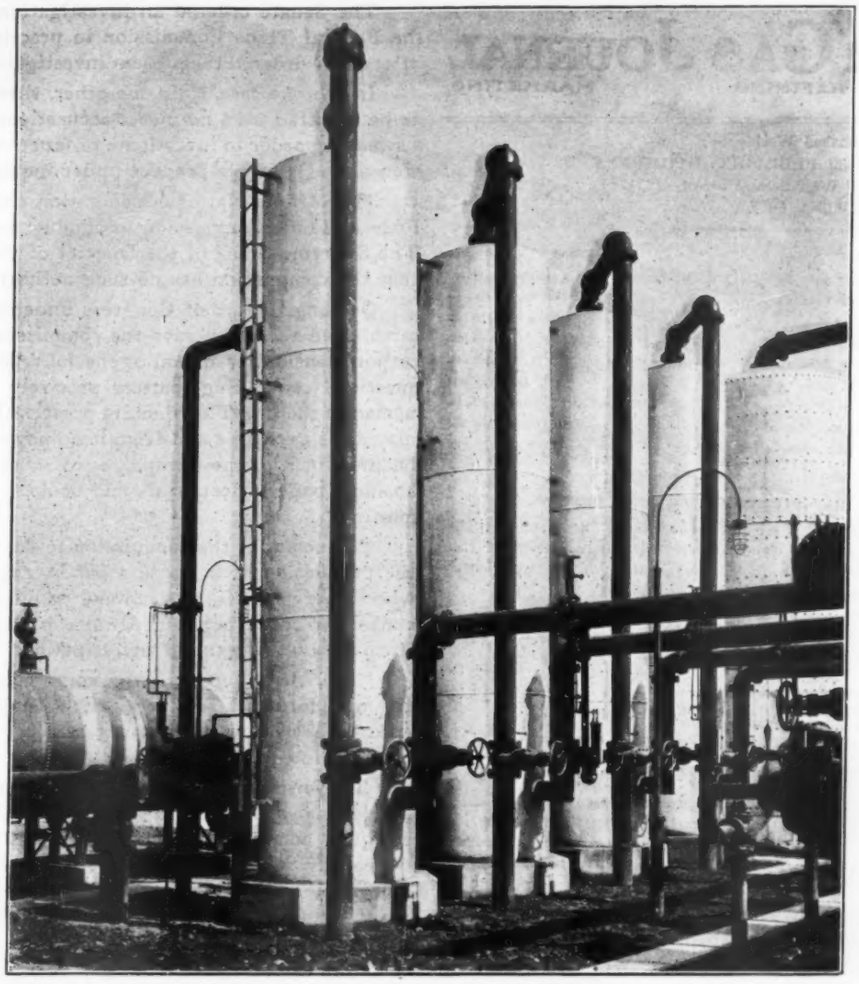

4 Newton Absorbers

In the New SINCLAIR GASOLINE PLANT in the GARBER-COVINGTON POOL

Newton Absorbers enjoy the distinction of being the most efficient and economical absorbers made.

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NO AUTHORITY TO RUMMAGE

The oil industry has nothing to hide from government investigation but it has an undoubted right to protest and challenge repeated and costly investigations that interfere with its legitimate operation of its business, causing needless and useless waste of time and money and retarding its everyday work.

Life in the oil industry is getting to be just one questionnaire after another.

The Federal Trade Commission had no sooner finished its first inquiry into gasoline prices than the Federal Oil Conservation Board was functioning. The conservation board had not even time to make its report before the Senate ordered the trade commission to conduct a second gasoline inquiry.

In the first investigation by the commission the oil industry very generally co-operated, throwing open books and papers without much question, although complying with the demands of the commission required the time of a large number of executives and employes who were thus diverted from their regular employment.

But when the trade commission, under resolution of the Senate, began a second similar investigation almost before the ink on its first report had time to dry, and oil men found themselves flooded with another series of questionnaires and demands for access to books and papers, with the prospect of the valuable time of executives and employes being further frittered away, it was time to ask when this sort of thing was going to end.

It was felt that if the trade commission had the right to demand any specific information it should limit its activities to that point instead of rooting around in a vague aim of unearthing something that might be featured as justifying the investigation.

From time to time there have been hints from the courts in test cases that the commission has no authority to conduct purely "fishing" investigations; that it must confine its inquiries to something definite.

A decision by the Supreme Court of the District of Columbia is very emphatic upon this point in a case which exactly parallels the present gasoline investigation.

The Senate ordered an investigation of the price of bread by the Federal Trade Commission in practically the same terms as it afterwards ordered the present investigation of the price of gasoline.

In the one case, as in the other, there were no specific charges to be inquired into, no direct accusations of law breaking, but just a sweeping order to investigate production, distribution, transportation and sale of the product under inquiry.

The Millers National Federation challenged the power of the Federal Trade Commission to conduct such a "fishing" expedition. The Supreme Court of the District of Columbia holds very plainly that the commission has no such authority.

Quoting the act of Congress under which the commission was established the court says the commission "may require of certain corporations either annual or special reports and answers to specific questions concerning matters precisely described, mentioned and named in the law. That definite prescription of what the commission may do is exclusive and from it no power can be implied to compel business men or their employes to submit themselves, their letters, business papers, documents and books, to examination by the commission."

The power of the commission to issue subpoenas and to require the production of books and papers applies only, the court holds, where there is a formal judicial or quasi-judicial hearing of some matters at issue between definite parties and no such hearing is involved in this general investigation.

"To hold otherwise," the court concludes, "would permit the commission to fish for facts which would justify filing a complaint and thereby allow a discovery which could not be achieved even by a bill in equity."

The distinction is made that "if matters of business privacy be material and relevant evidence for the protection of the public a legally constituted tribunal duly authorized to consider the evidence may, in the manner prescribed by law, compel their disclosure. But no mere administrative agency of the government has any right to invade the privacy of business except as prescribed by law within constitutional limitations.

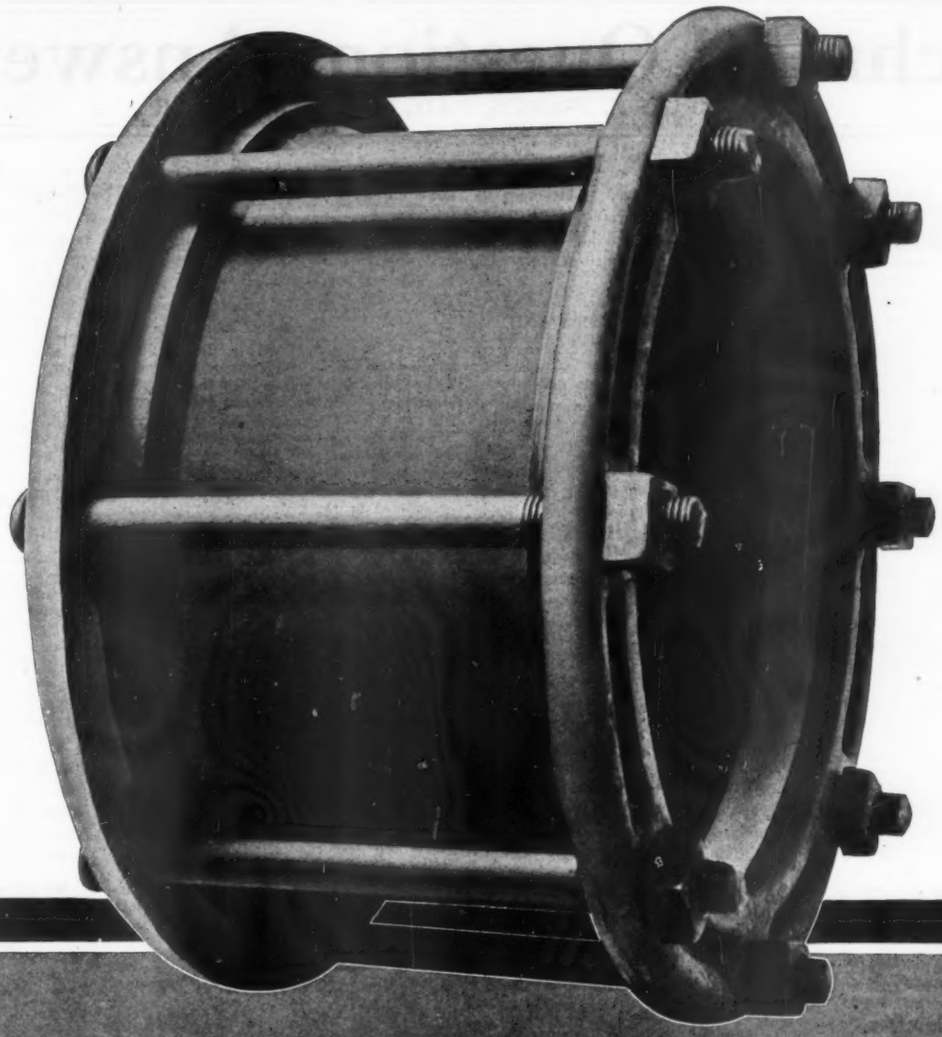
"Indeed, so far as natural persons or private organizations are concerned, it is certain that Congress cannot give administrative officials authority to rummage through their papers without their consent in the hope that evidence may be discovered for a public purpose. Administrative officers must keep within the statute in the exercise of their powers and if they threaten or seek to do something which is wholly beyond their jurisdiction they will be restrained."

One marketing organization in the oil business has announced its refusal to give access to its files to a representative of the trade commission, stating that "past experience cost us both money and time to readjust ourselves after our files had been carelessly gone through and practically everything put back in a jumbled and disorganized condition. Original copies taken out of our files were held until it required an urgent telegram to get them back."

It will be well if someone in the oil industry makes a test of the commission's authority as the Millers National Federation is doing. The decision of the District of Columbia court will no doubt be carried to the United States Supreme Court when the exact authority of the commission to harass legitimate business by "snooping" investigations will be determined.

Changes in the personnel of the commission have improved its membership but the commission as a body serves no useful purpose that could not be handled better and more properly in the regular courts. If there are illegitimate practices in trade the administration of the laws should be capable of dealing with them, having the power to compel the production of essential witnesses and evidence and to impose penalties prescribed by law.

It would be an incalculable boon to the oil industry and other businesses which have been hampered in their daily work and put to unnecessary expense by the demands and questionnaires of inquisitors to have the Supreme Court of the United States make a clear ruling on the constitutional rights of citizens and corporations in regard to the activities of congressional investigating commissions.



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Technical Questions Answered

BY CHARLES K. FRANCIS, PH.D., TECHNICAL EDITOR

The Question and Answer Department of The Oil and Gas Journal is devoted to the manufacturing branches of the oil industry. Those connected with the refining of crude petroleum, the manufacture of natural gasoline and closely allied industries are invited to submit their problems to Dr. C. K. Francis, technical editor. The department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products.

Questions should be submitted in as much detail as possible so as to assure a satisfactory answer.

All inquiries should be signed and if other than the given initials are to be used please indicate the desired letters.

Questions involving patented processes, intricate formulas and calculations and estimates of costs, for obvious reasons, cannot be answered. The replies will appear on this page within a reasonable time.

LUBRICATING OIL BLENDS

Can you please tell me if I could use dewaxed long residuum in compounding motor oils in place of bright stock?

I wish to compound 300 degree Gulf Coast with long residuum, Mid-Continent, to make medium, heavy and extra heavy motor oils. About what percentage of long residuum should be used?—R. C.

A dewaxed long residuum may be used for compounding motor oils in place of bright stock wherever oils of less viscosity are desired than the viscosity of the dewaxed long residuum itself.

Bright stock is the result of dewaxing steam refined stock. Dewaxed long residuum is the result of dewaxing a residuum which not only contains a portion of steam refined stock but also a portion of stock that would ordinarily be produced as wax distillate. Dewaxed long residuums are made in a variety of grades in all fields ranging in viscosity from 65 to 110 at 210, according to the market requirements. They may be blended in a variety of grades to conform with specifications, either as a heavy or an extra heavy motor oil. In some cases where the longer residuums are dewaxed they are used as a heavy-medium oil.

As to what use they may be put will depend on the specifications required for a given oil and the characteristics of the particular residuum produced. Dewaxed long residuum will blend with neutrals more readily than will bright stock because the dewaxed long residuums are less viscous and it is not necessary to go to so high a temperature in compounding in order to get a complete mix. The percentage, however, of neutral that will have to be used with the long residuum will depend upon two things, i.e., the characteristics of the particular residuum furnished and the characteristics of the finished motor oil required. What one refiner may call a medium or a heavy or an extra heavy oil does not necessarily correspond with the medium, heavy and extra heavy oil sold by another refiner. The percentages, therefore, of these various stocks to be utilized to blend for a specified oil can be determined only after exact information is available relative to the two variables mentioned above.

POWER TONICS, DOPES AND ACCELERATORS

Although in general we do not believe in gasoline dopes, we are informed of a product which is used in the proportion of 3 ounces to 10 gallons of gasoline for which is claimed greater mileage, freedom from carbon, non-pitting of valves and some antiknock properties. We have no means of checking up this type of product and would appreciate it if you would advise us of any information you may have about this material.—J. W.

We have no knowledge of the particular product to which you refer, however we may say that so far as our experience goes we have not been successful in confirming the remarkable claims made for products of this nature. There are some substances which have real merit as antiknock compounds but the additional very desirable properties of greater mileage, freedom from carbon and prevention from corrosion are not known to be included as accompanying characteristics. The same may be said, although in lesser degree, of the compounds which are said to give more power without adding some power-producing substance, also of those substances for which the claim is made of having the property of dissolving the carbon, and others alleged to be capable of preventing corrosive action.

The theories which have been advanced to explain how antiknock substances function include the idea that they act by radiation, that they absorb the electrons which are assumed to be direct cause of the detonation and that this is a distinct chemical property. Tetraethyl lead and benzol are used as a measure of this antiknock value.

Any substance that, when added to the gasoline, will give increased power and additional mileage must contain something which has a greater explosive range or produces more heat than gasoline under the conditions gasoline is consumed in the motor.

There is no common or cheap substance which will dissolve carbon, for if there were diamonds could be easily separated from the solution and would be as cheap as the old-fashioned rock candy.

Corrosion is the result of some foreign substance, such as sulphur, combining with the metal, or the action of acid. Anything used to stop or prevent corrosion must dissolve or neutralize the thing which is responsible.

TREATMENT OF HIGH-SULPHUR CONTENT CASINGHEAD GASOLINE

In the treatment of high-sulphur content casinghead gasoline such as produced in the Amarillo district of Texas to secure a finished product, which is both sweet to the doctor test and non-corrosive, kindly advise what chemical or process is best adapted.—E. L.

The treatment of gasoline produced from a gas containing abnormal quantities of hydrogen sulphide is usually based on methods which are similar to those used in refineries for the purification of gasoline and kerosene. Most natural gasolines should go through some kind of purifying process but ordinarily simply washing with water or contact with weak caustic soda will suffice.

There is no more reason that a fixed method should be adopted for the refining of natural gasoline than there is for selecting a detailed process for treating all raw gasolines produced in a refinery. The refiner must determine the character of the product and modify the application of the chemicals accordingly. The gasoline from natural gas should be sweetened by the process best adapted to the kind of gasoline obtained by the special process from the specific gas.

Hydrogen sulphide is frequently accompanied, in wet natural gas, by other sulphur compounds which have to be considered when determining the details of a method for sulphur removal. The application of large quantities of water, solutions of the common alkalies, including water and lime mixtures, have been found to produce good results. Some of the natural gasolines extracted from gas containing large quantities of hydrogen sulphide require the complete treatment for sweetening, such as water wash, alkaline wash, doctor solution and sulphur, then the final washing with water. Under some conditions the precipitate from the doctor solution will break out without the addition of the sulphur.

The process best adapted to your particular gasoline should be selected only after thorough investigation.

CRACKING CONDITIONS

What are considered to be the essential conditions for obtaining the maximum production of gasoline from a pressure process?—F. E. B.

There are a number of variables which influence the cracking of the hydrocarbons found in petroleum. Pressure, temperature and the length of time the material is kept under cracking conditions are probably the most important, but the additional factors of the kind of charging stock and the rate of removal of the gasoline formed must be considered.

Leslie and Potthoff have made a study of the cracking variables and have described their work in the Journal of Industrial and Engineering Chemistry for August, 1926, "The Cracking of Petroleum Oils," page 776. They state that pressure influences the rate of vaporization and thus the heat flow rate and temperature of the superheated films. Increases of pressure decreases the percentage of olefins. Pressure alone has no effect on the yield of gasoline.

The cracking rate is slow at 700 Fahrenheit, but rapid at 800 Fahrenheit. This conforms to the rule that chemical reactions in many instances proceed at a rate which doubles for every increase of 18 Fahrenheit. The above investigators found that the cracking rate was doubled for each 22 Fahrenheit rise in temperature.

Increased concentration and longer time of heating favor olefin condensation. At 800 Fahrenheit thermolized gas oil cracks to form lower boiling substances, but at a rate only half that at which the heavy fuel oil cracks and materially lower than that at which gas oil is decomposed. This indicates that oil which has been through a pressure still once will crack at a much lower rate than virgin oil. There may be so much difference in the molecular structure that the resulting gasoline will contain cyclic and olefinic compounds having value as antiknock compounds.

Removal of gasoline as formed has no effect on the yield or the boiling range of the gasoline produced. It does appear to have some influence on the quantity of the unsaturated compounds that may be formed.

There can be very little ground for the supposition that the walls of the still may have a catalytic effect, because these surfaces rapidly become coated with carbon. That carbon is without catalytic action is apparent when it is considered that even an extremely thin layer is sufficient to retard the rate of cracking in an externally heated vessel.

We have reason to believe that the cracking process is not one in which a state of equilibrium is reached, but that the apparent state of equilibrium is the result of decreased reaction rate caused by the lowered temperature resulting from heat loss.

Heavy fuel oil cracks most easily, gas oil nearly as readily, but recycle stock only 0.4 to 0.47 as rapidly.

LUBRICATING OIL FROM SEED

Are there any vegetable oils having lubricating properties similar to those of castor oil?—C. G. T.

We do not know of any oil that is extracted on a large scale from seeds, etc., which may be used in the same way that castor oil is used. Some months ago there was a report that an industry had been established in France which was making a fine lubricating oil from grape seeds. This oil had been found especially suitable for the lubricating of delicate motors, especially of the airplane type. It is said that the vineyards of central and southern France furnish enough seed to assure this new industry of an adequate supply of the raw material. The yield of lubricating oil from the grape seeds is estimated to be between 7 and 8 gallons of oil from the original ton of grapes.

BLENDING OF WAX FOR MELTING POINT

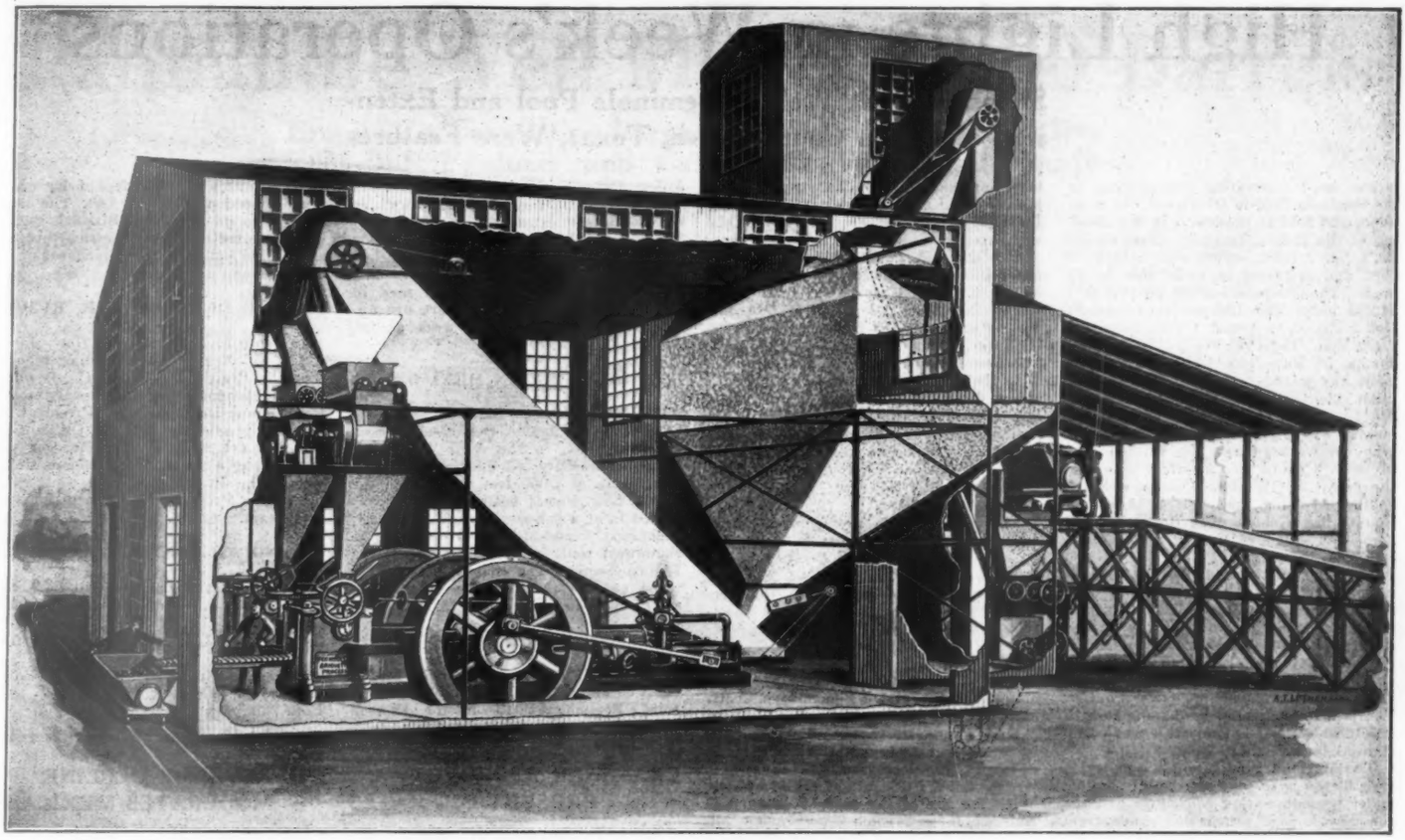
When mixing waxes to a desired melting point, what rule should be followed for the method of calculating the proportions?—W. A. C.

There are several ways for making this kind of a calculation, but a simple rule quite commonly used for determining the quantities of petroleum products of different gravities to be blended for some definite gravity may be used.

Suppose you have two waxes one having a melting point of 123.5 and the other 118, which it is desired to mix in the proper proportion to produce a wax having a melting point of 120. Then following the rectangle method, as outlined in The Oil and Gas Journal, June 17, 1926, we have

123.5		2
	120	
118		3.5

Therefore, two parts of 123.5 melting point wax and 3½ parts of 118 melting point wax should give a wax which will melt at 120 degrees Fahrenheit.



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High Lights in Week's Operations

Shooting First Well in Seminole Pool and Extension of Upton County Area, Texas, Were Features

The most interesting development in the Seminole Pool in Oklahoma, the most important field at present, was the shooting of the Indian Territory Illuminating Co.'s No. 2 Reed, which was making 30 bbls. and increased to 1,070 bbls. in 15 hours. The production of the pool reached 34,235 bbls. The Independent-Garland's No. 2 Fixico, deepened 1 foot, increased 1,000 bbls. The Prairie's No. 3 Kinkaid, flowing 55 bbls. from 4,119 feet has not made any water.

An extension of the Upton County area 3½ miles by the Wentz Oil Corp.'s well making 2,000 bbls. was the most notable event in west Texas. The Cosden well in Ector County had 200 feet of oil in the hole. The Winkler County well got another showing and a well in Fisher County has a show. The Brown County area was extended and a well making 502 bbls. completed.

In the Texas Panhandle, the Empire company completed an 8,000-bbl. well, the Phillips company a 5,000-bbl. producer and the Canyon company a well making 190 bbls. an hour, all in Hutchinson County, while the Gulf Production Co. had a producer making 1,650 bbls. in the Pampa district of Gray County. The production of the Panhandle rose to 125,125 bbls. and is likely to show a substantial increase next week.

The Marland Pipe Line Co.'s policy in west Texas is to take all the oil possible under present market conditions and the company is still purchasing crude from all small producers, merely asking big concerns to find a market of their own. Due to the Panhandle crude there is practically no market for west Texas oil which has about twice as much sulphur content and lower gravity. Marland is still making some new connections if the wells are of moderate size, otherwise it will run the oil to storage for producers.

In the Gulf Coast, the Gulf company got a 2,500-bbl. well in the Hull Pool and, Boling Dome had a 1,000-bbl. producer.

The Simms-Sun Co.'s No. 1 Simmons, in the Lawson area of Arkansas, went through 11 feet of dry white sand with no showing of oil or water. It is being prepared for test.

Reports that the Gulf Refining Co. had found dome formations near Napoleon, La., attracted attention.

The Huasteca company completed No. 80 Tierra Blanca, south fields, Mexico, showing 75,000 bbls. initial. The wildcat in the State of Tamaulipas, increased from the original estimate of 3,500 bbls. to 8,000 bbls.

OKLAHOMA

The first well in the Seminole Pool of Seminole County, Oklahoma, has been shot. It is the Indian Territory Illuminating Oil Co.'s No. 2 Reed, NW cor. SW NE, Section 24-9-6, and it was making 30 bbls. daily before the shot. After a shot of 40 quarts, the well made 1,070 bbls. in 15 hours. This is an offset to the Carter Oil Co.'s No. 1 Carter, and to the Gypsy Oil Co.'s No. 1 Carter.

For the 24 hours ending 7 o'clock Tuesday morning of this week, the Seminole Pool produced 34,235 bbls. from all wells in the north, east and south group. The production of the Wilcox sand wells follows:

Amerada Petroleum Co. and Gardner Petroleum Co.'s No. 1 Killingsworth	2,997
Carter Oil Co.'s No. 1 Carter	1,440
Gypsy Oil Co.'s No. 1 Carter	1,671
Indian Territory Illuminating Oil Co.'s No. 2 Reed	*1,070
Tidal-Osage Oil Co.'s No. 2 Mahardy	4,245
Independent-Garland's No. 1 Fixico	7,680
Independent-Garland's No. 2 Fixico	5,634
Total Wilcox production	24,717

*For 15 hours.

One of the most important developments of the pool was the completion of the Mid-Continent Petroleum Corp.'s No. 1 Fixico, SE cor. SE, Section 14-9-6. This well extends production a half mile west, and a half mile north, and throws open for drilling considerable territory north and west of its location. The Mid-Continent Petroleum Corp.'s well had the Wilcox sand at 4,188 feet and penetrated it 15 feet, with a total depth of 4,203 feet. The first hour of flow, it made 117 bbls.

In the northwest extension of the Tonkawa Field, T. B. Slick's No. 1 Siler, SW cor. NW NE, Section 28-25-1w, is making 40 bbls. an hour from a total depth which has been variously reported. It is believed that the approximate depth of the well is 4,250 feet. It is reported making some water.

This well extends production a quarter mile to the north. It is a quarter mile north of The Texas Company's No. 2 Siler, SW cor. NE, Section 28-25-1w, which revived the interest in this section of the field.

SOUTHWEST TEXAS

SAN ANTONIO, Tex., Oct. 5.—Associated Oil Co. and Usher Carson's discovery well in the Carolina-Texas Field, Webb County, that went from 134 bbls. of oil daily to salt water when the size of choke was increased a week ago, is now making half oil and half water. With the size of the choke reduced it is believed it will come back to all oil.

Scott & Kercheval have ordered casing for their Billings test near Smily in Gonzales County that has 102 feet of oil-bearing formation, total depth 1,182 feet. It will test out the last of this week.

The Texas Company's No. 2 Webster, two locations east, which failed to make a well at the 2,600-foot horizon and again at 3,000 feet where there is a gas sand, is now drilling below 3,100 feet and will continue to 4,200 feet where there is another sand.

Crown Central Petroleum Corp. has purchased all of the Rydal Oil Corp.'s property in the Aviator and Schott Fields of Webb County in the Mirando Field, paying $400,000 of which $135,000 is cash and $265,000 to be paid out of 30 per cent of the oil. Crown Central and Rydal owned other acreage with production together and a couple of weeks ago Crown Central bought the Rydal's half interest in that at about the same price, that deal, however, including some acreage in the Breckenridge Field in north Texas.

The Texas Company has paid $50,000 of which $20,000 is cash and $30,000 to be paid in oil for 80 acres comprising Blocks 1 and 2 of Survey 81 in the north end of the Randado Pool in Jim Hogg County and just beyond present production.

GULF COAST

HOUSTON, Tex., Oct. 5.—Yount Lee Lee Oil Co.'s No. 14 McFaddin at Spindletop is flowing 5,000 bbls. at 2,800 feet through two chokers.

Gulf Production Co.'s No. 74 Phoenix, in the Hull Pool, is flowing 2,500 bbls. at 3,400 feet.

PENNSYLVANIA

TIONESTA, Pa., Oct. 5.—Rembold & Co. of Oil City, have drilled in, shot and connected their No. 6 well on Osten 18-acre lot, Dawson Run district, capable of producing 50 bbls. of oil daily, one of the best wells brought in by this company.

CALIFORNIA

LOS ANGELES, Calif., Oct. 5.—The Miley Petroleum Exploration Co. has just finished another deep zone well in the southwest extension of Huntington Beach doing 1,500 bbls. daily. The new well, No. 4 Pacific Electric, was finished at 4,007 feet. This is the fourth flowing well brought in from the deep sand in this extension but several more are anticipated within the next week or ten days.

BIG WELL IN MEXICO

By George Blardone

TAMPICO, Mexico, Oct. 2.—Huasteca Petroleum Co., in the south fields, has just completed its No. 80 Tierra Blanca, at a depth of 2,055 feet, rated good for 75,000 bbls. initial head. This well was drilled in at a sub-sea level of 1,884 feet, Tamasopa limestone. It is one of the shallowest wells yet drilled in the Tierra Blanca sector. The closed pressure is rated at 607 pounds. The other fields are devoid of special interest.

ARKANSAS

SHREVEPORT, La., Oct. 5.—Simms Oil Co. and Sun Oil Co.'s No. 1 Simmons, Section 6-18-13, in the Lawson area, Arkansas, cored 11 feet of dry white sand, topped at 2,933-44 feet. The sand showed no oil or water. Six-inch casing was cemented on top of the sand but because of a split joint 4½-inch casing is to be set and a test made.

PRAIRIE DENIES P. & R. RUMOR

In reply to a query from Dow, Jones & Co., of New York, regarding reports that the Prairie Oil & Gas Co. is planning an exchange offer for minority stocks Producers & Refiners Corp., President N. K. Moody said the Prairie Oil & Gas Co. will not make a new offer for the outstanding Producers & Refiners Corp. stock. The Prairie has held controlling interest in Producers & Refiners for several years.

NORTH CENTRAL TEXAS

Westbrook and Eastland Oil Co.'s No. 1 Hendricks in Winkler County had 500 feet of oil in the hole at 2,725 feet, with the pay just touched. This is 170 feet in big lime.

Cosden's No. 1-A Connell, Ector County, has 800 feet of oil at 3,475 feet. Both shut down for tankage.

EXAMINER APPROVES PRESENT OIL RATES

WASHINGTON, D. C., Oct. 4.—The report of Irvine L. Koch, examiner of the Interstate Commerce Commission, in the hearing of the rate case of the Galveston Commercial Association versus the Galveston, Harrisburg & San Antonio Railroad was made today to the commission.

The report is made of the examiner's conclusions and recommendations in the case, involving the fight between Texas ports and New Orleans for petroleum, as well as grain and other products, from northern Texas, Oklahoma and southern Kansas. The report is not binding and the commission may do what it wishes with it, either reject or accept it in part or in its entirety.

The examiner's recommendations were that rates on petroleum and petroleum products in export or coastwise movement from southern Kansas, Oklahoma, and north Texas to Galveston and other Texas ports and rates from points in north central Texas to New Orleans and Galveston and points taking the same rates should be found not unreasonable or unduly prejudicial.

OVER QUARTER BILLION IN GASOLINE TAXES

A total of $287,718,335 was collected in gasoline taxes in the United States from 1919 to 1925, inclusive, according to figures announced by the Bureau of Public Roads at Washington, D. C. The rapid growth of the gasoline tax as a source of revenue is indicated in that receipts increased from $1,022,514 in 1919, to $148,258,087 in 1925.

In 1919, only four states had a gasoline tax but in 1925 this list had swelled to 44 states and the District of Columbia. The tax collected by years was: 1919, 4 states, $1,022,514; 1920, 5 states, $1,363,902; 1921, 15 States, $5,382,111; 1922, 19 states, $12,703,088; 1923, 35 states, $38,566,338; 1924, 35 states and the District of Columbia, $80,422,295; 1925, 44 states and the District of Columbia, $148,258,087.

OIL REVENUE DECLINE MODERATES MEXICANS

By Charles E. Kern

Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Oct. 4.—The recent regulations affecting the Mexican petroleum industry, unlike former regulations, are signed by President Calles as well as by the Secretary of Industry, Commerce and Labor. The principal change made by the new order is to require a bond of 100,000 pesos for each well drilled on lands to which the title of the oil companies is not proven, instead of the "unlimited bond" required by the order of June 8. However, the most serious objection has not been removed, that the title of oil companies to oil lands would, in effect, be at the mercy of an administrative official.

This order refers only to provisional permits to drill on lands, regarding which the oil companies have not fully proven their title. According to a statement made to the press by Hilarion V. Branch, representative of the Huasteca Petroleum Co., it appears this company is obtaining drilling permits by proving its titles to the satisfaction of the legal staff of the Mexican Department of Industry, Commerce and Labor, thereby avoiding putting up the bond and fulfilling the other requirement set forth in the departmental orders.

While Mr. Morones, Secretary of Industry, Commerce and Labor, does not appear to be disposed to compromise with the oil companies and would like to carry the policy of nationalization out to its conclusions, there are other influences in the Calles Government, particularly Secretary of the Treasury Pani, who want to encourage the oil industry by more favorable legislation. The decline in revenues from oil production has reached serious proportions, and naturally the Secretary of the Treasury is much concerned on that account. Within the last few weeks, this influence appears to have had some success in bringing about a more liberal attitude toward the oil companies, as the companies have had less difficulty in obtaining drilling permits.

Panhandle Well Makes 8,000 Barrels

Empire Co. Completion Largest in Weeks. Phillips Co. Gets 5,000-Bbl. Producer and Canyon Co. 190 Bbls. Hourly

By C. D. Lockwood
Staff Correspondent, Texas Panhandle

An 8,000-bbl. well by the Empire Gas & Fuel Co., a 5,000-bbl. gusher by the Phillips Petroleum Co. on the Gordon lease, and another flowing 190 bbls. hourly by the Canyon Oil & Gas Co., all in Hutchinson County, combined with a 1,650-bbl. completion by the Gulf Production Co. in the Pampa Pool of Gray County, and a few other excellent additions such as the McMan Oil Co.'s 65-bbl. an hour producer on the Johnson-Martin Gray property in Hutchinson County, all contributed toward a net gain of 1,275 bbls. in the entire Texas Panhandle district during the past week, and will probably cause a further substantial rise next week. The estimated daily production of 125,135 bbls. for the current 7-day period represents a new peak, although Hutchinson County gained only 465 bbls.

The storage and pipeline situation remains about the same and a number of the smaller independent producers as well as a few of the large companies show declines again this week which are attributable to the congestion. The completion of the new Santa Fe branch line to Isom in the heart of the Hutchinson County Field may help to some extent after the line is opened October 15, but it can hardly be expected to remedy the conditions more than partially. In the meantime, the Arctic Circle may be extended southward into Hutchinson County most any time now and judging by the brief taste of it a couple of weeks ago, some of the operators and pipeline companies are going to have a merry time trying to move their products. The Marland line is well protected with heaters and is covered with 48 inches of earth. These heaters have been tested out for the past two or three weeks and have been delivering the oil to the loading rack through a distance of 42 miles at a temperature of 110 degrees. At this rate it is believed that oil can be delivered successfully even in the coldest weather.

Made 8,420 Bbls.

The Empire Gas & Fuel Co.'s No. 5 Weatherly, in the NE cor. SE NE, Section 19, Block Y, Hutchinson County, was the most sensational well of many weeks in the entire Panhandle district when it increased by agitation and swabbing without shooting or drilling deeper to a maximum of 8,420 bbls. in one day from pay sand at 2,972-3,015 feet, total depth being 3,026 feet. The Phillips Petroleum Co.'s No. 2 Johnson-Gordon, in the NW cor. NE, Section 21, Block Y, came in for 5,000 bbls. following a 120-quart shot at 2,896-2,943 feet and the Canyon Oil & Gas Co.'s No. 6 J. A. Whittenburg, NE cor. SW SW, Section 12, Block Y, for 190 bbls. an hour at 2,745-50 feet.

The Alaska Petroleum Co.'s No. 1 Cockrell, in Section 2, Block B-3, D. & S. E. Survey, southeast of the main Block Y production, flowed 240 bbls. in the first five hours after a second shot which amounted to 520 quarts placed at 2,926-3,049 feet. At latest report, the well was doing 20 bbls. an hour.

Gulf Production Co.'s No. 20 Dial was flowing 40 bbls. at 2,923 feet and No. 22 was flowing 50 bbls. at 2,817 feet. Both of these wells are to be shot. No. 26 Dial flowed 30 bbls. while cleaning out at 3,023 feet. A location has been made for No. 38 Dial, 330 feet north and 350 feet east of the SW cor. SE, Section 90, Block Z, and cellar is being dug. No. 4 J. A. Whittenburg-B was cleaned out at 2,966 feet and flowed 75 bbls. after a shot.

Marland Oil Co.'s No. 1 River Bed is getting down close to the pay zone and will be watched with interest during the next week or two. Its elevation is 2,795 feet and it was drilling at 2,715 feet Sunday.

DAILY AVERAGE PRODUCTION OF THE AMARILLO DISTRICT

Week Ending October 2, 1926
Hutchinson County

Company—	Wells	Daily Average Last Week	Daily Average This Week
Alaska Pet. Co.	1	75	50
Amerada Pet. Corp.	8	825	440
American Refining Co.	2	105	70
Apex Oil Co.	2	300	250
Badger Oil Co.	2	205	165
R. G. Barnum	1	0	0
Buffalo Oil Co.	1	30	35
Canadian River Oil Co.	4	485	475
Canyon Oil Co.	4	3,500	4,800
Center Dome Oil Co.	1	0	0
Centerfield Oil Co.	1	0	0
Coble-Whittenberg	3	775	800
Currie Bros. and J. R. Phillips	2	100	150
Cockrell & McIlroy	3	540	500
Delmar Oil Co.	1	35	35
Derby Oil Co.	4	1,375	1,325
Devonian Oil Co.	3	850	500
Dixon Creek Oil Co.	21	6,545	6,100
Double Five Oil Co.	1	75	50
Douglas Oil Co. and Cline	1	20	10
E. J. Dunnigan et al	3	1,175	1,150
Echo Oil Co.	3	1,175	1,125
Empire Gas & Fuel Co.	6	715	3,440
Fly-Blackburn Oil Co.	2	250	225
Gates Oil Co.	4	405	400
Goldfiline Oil Co.	2	360	310
Golding & Phillips	1	0	0
Gulf Prod. Co. and Panhandle Ref. Co.	32	6,040	7,295
Gulf Production Co.	18	4,460	4,325
Heywood et al	2	0	0
J. K. Hughes Dev. Co.	12	2,100	2,150
Holmes, Currie & McKnight	2	350	320
W. H. Holmes	1	235	250
Hutchinson Co. Oil Co.	1	0	0
Dan A. Japhet	3	605	575
J. H. Lenix	1	0	0
Lenix & Patterson	1	270	285
Lucky 10 Oil Co.	3	1,150	1,100
Marland Oil Co.	34	18,015	17,020
Midwest Exploration Co.	5	350	335
Minnehoma Oil Co. and Kistler	1	235	180
McMan Oil & Gas Co.	15	6,355	6,920
McIlroy & Herring	4	450	435
S. D. and W. W. McIlroy.	5	1,850	1,535
McIlroy Bros. et al	3	340	320
J. H. Middleton	3	70	55
Murchison & Fain	1	360	365
Newby Oil Co.	1	55	45
New Domain Oil Co.	3	160	110
Phillips & Heywood	2	2,140	2,200
J. R. Phillips	1	25	20
Phillips Petroleum Co.	61	20,405	18,420
Prairie Oil & Gas Co.	20	3,510	2,910
Relief Oil Co.	3	1,250	1,410
Riley & Holmes	1	360	340
Roxana Pet. Corp.	8	2,145	2,085
Ryan Pet. Co.	2	530	490
Skelly Oil Co.	13	6,750	7,575
Skiatex Oil Co.	4	875	900
J. L. Smith	2	275	230
Smith & Byrum	2	400	350
Spring Creek Oil Co.	4	825	720
Sunny Jim Oil Co.	6	650	510
Sunburst Oil Co.	2	1,300	1,200
Sunrise Oil Co.	1	0	10
Travelers Oil Co.	2	660	640
Triangle Oil Co.	2	2,820	2,600
J. D. Ward	1	65	60
J. D. Ward et al	1	55	50
Westex Oil Co.	7	3,570	3,700
White Eagle Oil & Ref. Co.	16	2,600	2,500
J. O. Whittington	1	0	0
Total Hutchinson Co.	403	114,950	115,415
Average per well		290	286
Carson County			
Amarillo Oil Co.	1	0	0
American Ref. Co.	7	535	510
Gates Oil Corp.	1	10	10
Gulf Production Co.	14	360	405
Marland Oil Co.	12	2,565	2,160
Roxana Pet. Corp.	1	125	400
W. W. Silk et al	3	90	120
Skelly Oil Co.	2	85	90
Sunny Jim Oil Co.	2	45	40
The Texas Company	11	320	285
Total Carson County	54	4,135	4,020
Average per well		76	74
Gray County			
Empire Gas & Fuel Co.	1	10	10
Gulf Production Co.	2	95	720
Magnolia Pet. Co.	2	50	70
McMan Oil & Gas Co.	1	110	410
Prairie Oil & Gas Co.	3	1,035	1,080
Wilcox-Pampa Oil Co.	7	2,965	2,995
The Texas Company	1	15	0
Total Gray County	17	4,270	5,265
Average per well		285	311
Potter County			
Amarillo Oil Co.	1	30	25
Wheeler County			
Gibson Oil Corp.	2	150	150
Continental Oil Co.	2	275	200
Mid-Kansas Oil & Gas Co.	1	35	25
Midwest Exploration Co.	3	15	15
Total Wheeler County	8	475	390
Average per well		59	48
Grand total Panhandle	482	123,860	125,135
Average per well		261	259
Average per well last week		261	
Total Panhandle four weeks ago	399	116,101	
Average per well four weeks ago		291	

RECAPITULATION

County—	First Reports	Drlg. Wells	S.D.
Armstrong	0	1	0
Carson	4	37	1
Collingsworth	0	3	1
Dallam	0	0	2
Donley	0	0	1
Gray	0	83	22
Hansford	0	1	1
Hall	0	0	0
Hartley	0	8	3
Hemphill	0	4	2
Hutchinson	15	367	32
Lipscomb	0	4	0
Moore	0	11	2
Ochiltree	0	3	1
Potter	0	5	0
Randall	0	0	1
Roberts	0	3	3
Sherman	0	2	1
Wheeler	0	17	5
Total	19	549	77

Texas Panhandle Completions
Hutchinson County

Amerada Petroleum Corp.'s No. 3 J. A. Whittenburg-A was shot with 50 quarts at 2,914-65 feet, making 90 bbls., and was re-shot with 300 quarts at 2,900-65 feet, making 100 bbls.; No. 5 J. A. Whittenburg-B was re-shot with 300 quarts at 2,969-3,032 feet, making 150 bbls. Bozo Oil Co. abandoned the rig for No. 1 W. B. Haile.

Canyon Oil & Gas Co.'s No. 6 J. A. Whittenburg, Section 12, Block Y, was flowing 190 bbls. an hour at 2,730-40 feet, total depth 2,750 feet. Currie and others abandoned the location for their No. 1 Smith, NW cor. NE, Section 10, Block Y. This is a little over a quarter of a mile south of production. J. K. Hughes Development Co.'s No. 16-A Kingsland, Section 6, Block Y, flowed 140 bbls. naturally at 2,835-2,954 feet; No. 4 Kingsland-B, Section 6, Block B-4, flowed 150 bbls. naturally at 2,705-82 feet; No. 5 Kingsland-B made 100 bbls. after a 60-quart shot at 2,708-68 feet.

Dan Japhet's No. 3 Smith, Section 11, Block Y, flowed 200 bbls. from pay at 2,688-2,740 feet. S. D. and W. W. McIlroy's No. 8 Smith, Section 14, Block Y, was flowing 50 bbls. an hour following a 300-quart shot at 2,8752,955 feet. McMan Oil & Gas Co.'s No. 3 Johnson-Martin Gray, SW SE NE, Section 21, Block Y, flowed 65 bbls. an hour naturally at 2,894-2,953 feet. Midwest Exploration Co.'s No. 1 Smith-Dick, Section 5, Block Y, was shut in at 2,650 feet, making 30,000,000 feet of gas; No. 1 Smith-Tyrell made 200 bbls. at 2,687-2,744 feet.

Phillips Petroleum Co.'s No. 3 Johnson-Gordon, SE cor. N half NE, Section 21, Block Y, was shot with 80 quarts at 2,932-63 feet and was flowing 55 bbls. an hour; No. 2 Johnson-Gordon, NW cor. NE, same section, was shot with 120 quarts at 2,896-2,943 feet, total depth 2,952 feet, and flowed 5,000 bbls. afterward; No. 3, SE cor. NE, same section, was flowing 30 bbls. an hour naturally at 2,915-25 feet, total depth 2,-935 feet. Phillips Petroleum Co.'s No. 3 Whittenburg-Jerry, SE SE, Section 13, Block Y, was swabbing 200 bbls. daily at 2,783-2,825 feet. Skelly Oil Co.'s No. 1 J. E. Pritchard, Section 3, Block B-4, flowed 165 bbls. at 2,785-2,806 feet. Westex Oil Co.'s No. 6 J. A. Whittenburg, Section 13, Block Y, flowed 300 bbls. at 2,825-2,928 feet.

Moore County

Prairie Oil & Gas Co.'s No. 2 Sneed

(Continued on Page 354)

FARMINGTON, NEW MEXICO, AREA REPORTS RENEWED FIELD ACTIVITY

FARMINGTON, N. Mex., Oct. 2.—The Portage Oil & Gas Syndicate, operating on the Glade structure, Section 34-30-13, 6 miles northeast of Farmington, has succeeded in sidetracking the joint of casing and string of tools in the bottom of the old hole and has the 8¼-inch casing run well toward the bottom, but at the last report had not got it entirely down. If this is not successful it may be cemented in and make a water shutoff where it is or 6-inch casing may be run, though it is not desired to do the latter if it can be avoided. At any rate it will be only a short time until the drill will be testing out new levels on this structure.

W. R. Childers, operating in the Ute Pasture district, Section 24-31-16, has succeeded in loosening the casing which was dropped while being run and buckled a short distance at the bottom. As it was only a short part at the bottom that bent it was the intention to drill it out if it could not be loosened, but it now seems certain it can be successfully pulled. This location is about 20 miles northwest of Farmington. Another drilling campaign in this district is about ready to be announced if street reports are correct.

The Congress Oil Co., operating in the Kutz Canon district, Section 34-29-11, is still closed down awaiting casing.

The Southwestern Development Co., drilling on the Atteberry place, 6 miles north of Aztec, Section 24-31-11, for which C. S. Ringle had the contract to drill to a depth of 1,200 feet, has completed this contract and work has been suspended.

The Ross-Bloomfield Royalties Co., operating in the Bloomfield district, Section 11-29-11, is drilling at a depth of about 2,360 feet and making slow progress as it is drilling inside a 4-inch casing.

J. F. Wolking and associates of Albuquerque, who will operate in this field under the name of the Hagan Oil Co., are arranging to drill in the old Aztec fairgrounds and expect to spud in by the end of this week.

The Union Oil & Mining Co., operating in the Blanco district, Section 8-29-9, was still fishing at the last reports at a depth around 3,000 feet.

E. J. Miley, operating on the Red Mesa structure, Section 32-33-12, is drilling at a little deeper than 1,000 feet, with a good flow of gas and is making satisfactory progress and expects to reach the Dakota sands before hard freezing weather sets in as both cold and snow may interfere with operations in this district.

Arrangements are in progress for the spudding in of two more wells on the Red Mesa structure and it is expected this will be done before the end of October.

A group of operators that have associated for development work in this field and part of whom are the owners of Tract D in the Ute Pasture, which was sold at the last Navajo lease sale, have been here. In the group are F. H. Gose and James I. Harvey of Wichita Falls, Tex.; J. A. Hodge of Fort Worth, Tex.; F. P. Powell and wife of Dallas, Tex.; and F. L. Harvey and Frank Staplin of Santa Fe.

Upton County Area Extended by Wentz

Well Making 2,000 Bbls. Three and One-Half Miles From Production. Ector, Fisher and Winkler County Wells Features

By C. D. Lockwood
Staff Correspondent, North Texas Fields

FORT WORTH, Tex., Oct. 4.—An extension of 3½ miles to the producing territory in Upton County west Texas, the completion of another well on the Dixie-Hughes lease in the same county for 1,152 bbls. of pipeline oil, the discovery of 200 feet of oil in J. S. Cosden's Ector County wildcat known as No. 1-A Connell, the discovery of another oil showing in Winkler County's famous wildcat test at a depth of 2,748 feet, a showing of live oil in a Fisher County well, just west of Jones County, a northwesterly extension to the Dunn-Stover Pool in Brown County making more than 700 bbls. daily, and a record completion in the Fry Pool near Trinity in the same county which was good for 502 bbls. initially, were some of the achievements of north and west Texas operators during the past week.

The Upton County extension caused a wild flurry of lease buying, which caused the expenditure of $108,000 for holdings in the vicinity, according to one operator's tabulation. The Wentz Oil Corp. of Ponca City, Okla., caused all of this excitement when its No. 1 Sherk, in the NW cor. SE of Section 35, Block 1, M. K. & T. Survey, located about 2 miles west and the same distance north of the town of Hurdle, and about 3½ miles east of production on the Burleson and Della Bowen leases, came in at midnight September 30 estimated at 2,000 bbls. daily. The well had to be shut in because of insufficient storage, and the oil broke through between the 6 and 8-inch and also behind the 8-inch. When the 6-inch was opened up later, the well flowed by heads at the rate of 170 bbls. in 19 hours, and there was 700 feet of water in the hole. This water, however, is probably due to faulty casing seat. Monday the owners were preparing to run 5-inch with packer, and the exact worth of this particular well will not be known for several days. However, it definitely proved up considerable territory and adds further evidence that the west Texas district is destined to develop into one of the greatest fields in the country.

The Wentz Oil Corp. purchased this property from Johnston & McCamey, veteran west Texas wildcatters, only recently. The consideration was said to have been about $25,000 for approximately a section of land, scattered as shown on the accompanying map. After the well came in, the Atlantic Oil Producing Co. bought a half-interest in three 80-acre tracts, including one offset for $40,000 and two free wells. Roxana Petroleum Corp. paid $20,000 for the southeast quarter of Section 31, a mile east and half a mile north of the well, and The Texas Company and Roxana are reported to have paid as high as $200 an acre for parts of Section 21, a couple of miles east of the producer. The Union Land Co. is going to drill in the southwest corner of that section and will start up right away. The Atlantic Oil Producing Co. is starting an offset to the west of the Wentz discovery, and the Gulf Production company has located its No. 1 Sherk-E directly north of it, in the SW cor. NE of Section 35, a 330 foot location. The rig is now building. The northwest quarter of Section 35 was still open last Saturday, the Sherk estate having refused an offer of $500 an acre in cash and $250 in oil.

Ector County Wildcat

Of perhaps greatest importance to the west Texas wildcatting industry was the report by wire Monday afternoon that the J. S. Cosden No. 1-A Connell in Ector County had 200 feet of oil in the hole at 3,465-75 feet, with some gas. This will mean a considerable shift in the wildcat play north of Crane County. This well is in the NE of Section 13, Block 16, near the south line of the county. It had a small showing of oil at 3,435 feet, making about two-thirds of a bailer.

Westbrook and Eastland Oil Co.'s No. 1 Hendricks in Winkler County was reported late Monday to have 250,000 feet of gas and 100 feet of oil in the hole at 2,748 feet and to have been shut down for orders.

In northern Fisher County, the Ideal Oil Co.'s No. 1 W. F. Martin, in the NW of Section 113, Block 1, T. & T. C. Survey, topped lime at 3,345 feet and bailed 4 gallons of live oil, with a show of gas. The 6-inch was set at 3,000 feet and the well was drilling at 3,390 feet.

The Jones County well, Phillips Petroleum Co.'s No. 1 Winters, produced as follows from September 22 to 29, inclusive: 912 bbls., 865 bbls., 840 bbls., 677 bbls., 805 bbls., 645 bbls., 807 bbls., 620 bbls.

In Winkler County, Brandon & McCamey's No. 1 Kloh & Rumsey, SW cor. Section 11, Block 46, T. & P. Survey, had a hole full of salt water at 3,290 feet and was shut down.

Brown County Extension

In Brown County, the Humble Oil & Refining Co.'s No. 2 Hickman produced 737 bbls. at 1,190-1,235 feet. It extends production a location to the northwest. In the Fry Pool, near Trinity, William Lester's No. 5 M. E. Fry was a sensational producer for this area, flowing 502 bbls. the first 24 hours and 488 bbls. on the fifth day.

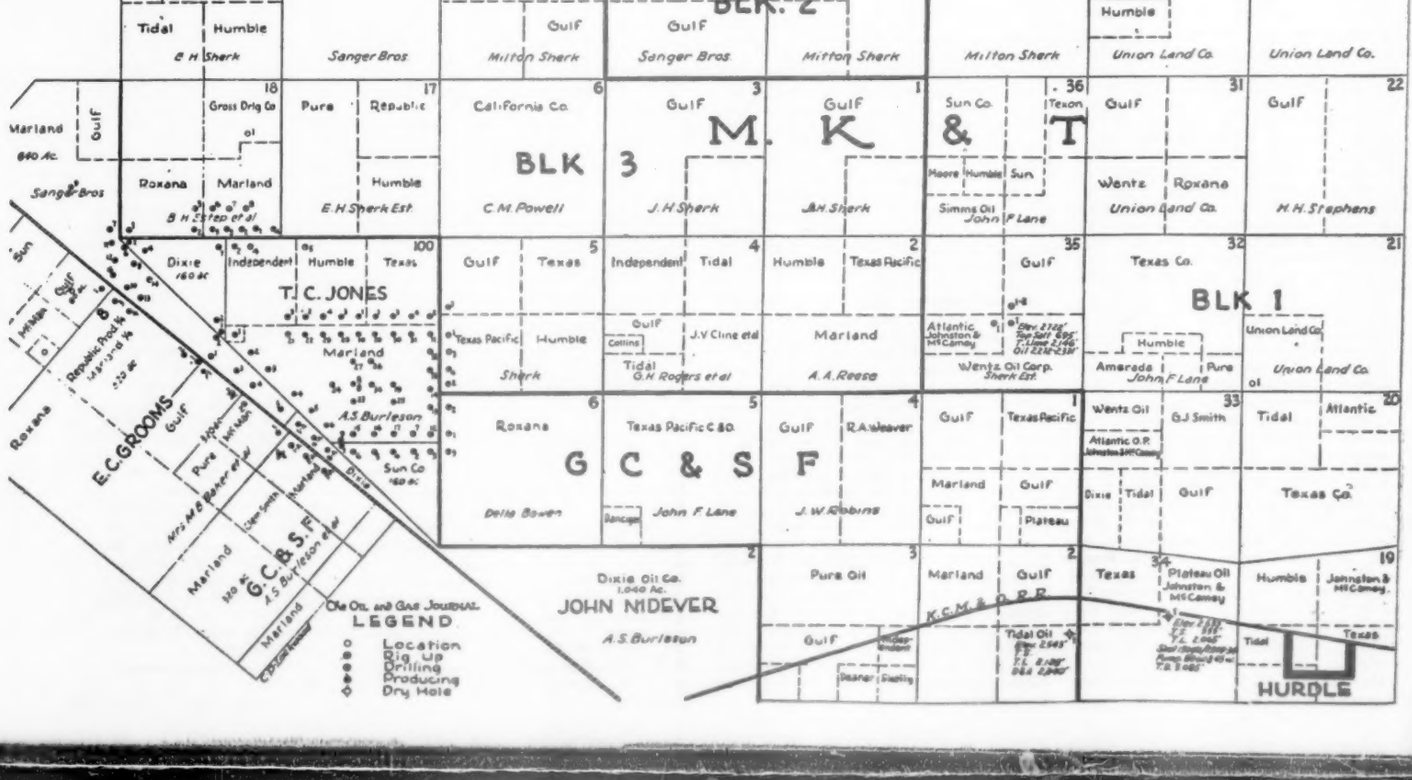
In Archer County, the Simms Oil Co. and Burns' No. 1 J. H. Turbeville-A in the SE of Section 142, Robert Carson Survey, was swabbing 200 bbls. daily at 1,498-1,503½ feet after the plug was drilled out. Marland Oil Co.'s No. 7 Turbeville was estimated at 500 bbls. or more at 1,493-1,525 feet.

NORTH CENTRAL TEXAS ESTIMATED PRODUCTION
Week Ending October 2, 1926

	This Week	Last Week
Ranger District—		
Brown County	12,642	12,103
Callahan County	4,217	4,348
Coleman County	1,770	1,800
Comanche County	1,780	1,780
Palo Pinto County	432	423
Ranger County	5,463	5,520
Shackelford County	10,128	10,309
Stephens County	11,082	11,162
Total Ranger District	47,514	47,455
Wichita Falls District—		
Electra	18,944	19,281
Burkburnett	11,656	11,702
Iowa Park	4,311	4,205
Archer County	32,337	30,854
Clay County	667	664
Wilbarger County	14,126	14,478
Montague County	8,329	8,155
Young County	8,212	8,356
Jack County	215	220
Throckmorton County	1,394	1,416
Baylor County	142	148
Cooke County	471	865
Total Wichita Falls Dist.	100,804	99,854
West Texas District—		
Big Lake Field	29,252	28,838
Crane County	712	856
Crockett County	1,138	1,180
Howard County	401	377
Mitchell County	3,467	3,527
Scurry County	50	38
Upton County	9,826	8,736
Jones County	700	900
Total West Texas Dist.	45,546	44,441
Grand total	193,864	191,750
Increase	2,114	

Increases of 1,100 bbls. in Upton County, 400 bbls. in the Big Lake Field of Reagan County, 1,483 bbls. in Archer County, 539 bbls. in Brown County, and smaller gains in Montague, Cooke and a few other counties accounted for the net gain of 2,114 bbls. daily during the past week in the whole of north and west Texas, outside of the Panhandle. It is interesting to note that Montague County again established a new peak, this week having passed Young County, and

(Continued on Page 352)



Seminole Pool Growing in Interest

Independent-Garland Well Increases Output With Deeper Drilling. Prairie Completion Free From Water

By J. L. Dwyer
Staff Correspondent, Oklahoma Fields

The only competition which the Seminole Pool, in Oklahoma, experienced in the way of attracting attention of the oil industry was the World's Series baseball games at St. Louis. The proximity of the Mound City to Tulsa caused many officials to make the trip.

The Seminole Pool continues to grow and to occupy a more commanding position. Its influence upon the market is bound to be felt before very many more wells are drilled in.

There were two important events in Seminole during the past week. First the Independent Oil & Gas Co. and R. F. Garland's No. 2 Fixico, SE cor. SW NE, Section 26-9-6, was drilled 1 foot deeper, and the rate of flow increased 1,000 bbls. daily. This well is now only 4 feet in the sand, and it is producing better than 5,600 bbls. daily. The other important occurrence of the past week was the drilling in of the Prairie Oil & Gas Co.'s No. 3 Kincaid, SE cor. SE, Section 33-10-6. This well found the Hunton lime at 4,039 feet, and the pay in the lime was found at 4,108 feet. The well has a total depth of 4,119 feet, and is flowing at the rate of 55 bbls. an hour. It has not made any water. The only other well in the north end of the field which has been free from the intrusion of water is the Mid-Continent Petroleum Corp.'s No. 1 Grayson, NW cor. SW SW, Section 34-10-6. This well is a quarter-mile north and a location east of the Prairie's new well, and the fact that these wells are free from water indicates that the locality west and south of a line drawn between these wells will be highly productive as it is above the water level.

Three Groups of Production

From an inspection of the logs of completed wells in the field it is apparent that there will be three groups of production. The north group, in Township 10-6, the east group in Section 24-9-6, and the south group around the Independent Oil & Gas Co. and R. F. Garland's lease in Section 26-9-6.

The first group are producing from the Hunton lime only. In both of the other two groups of wells, production has been found in the Hunton and Wilcox sands. The Wilcox sand has never been penetrated in the north group of wells, and many believe that before the final chapters of Seminole history are written, the Wilcox will yield some oil in that region. Although not enough wells have reached the Wilcox sand to permit any study of comparative production in the same location, it is thought unlikely that both of these horizons will produce in the same spots. This theory is based upon past experience only, and not upon Seminole.

Seminole Production

The Seminole Pool made 32,380 bbls. on Sunday of this week from a total of 23 wells. Out of this amount, six Wilcox sand wells made 22,850 bbls. distributed as follows:

Independent Oil & Gas Co. and R. F. Garland's No. 1 Fixico	7,361
No. 2 Fixico	5,612
Amerada Petroleum Co. and Gardner Petroleum Co.'s No. 1 Killingsworth	3,160
Carter Oil Co.'s No. 1 Carter	1,455
Gypsy Oil Co.'s No. 1 Carter	1,877
Ti I-Osage Oil Co.'s No. 1 Mahardy	3,385
Total	22,850

Carter Gets Good Well

During the week the Carter Oil Co.'s No. 1 Carter, SW cor. NE NE, Section 24-9-6, had the Wilcox sand at 4,155-70 feet and made 1,455 bbls. This well is a north offset to the Indian Territory Illuminating Oil Co.'s No. 2, which is a very light well in the Wilcox sand making 30 bbls. The finding of a good well immediately north of the light I. T. I. well seems to indicate that the Wilcox production in this part of Seminole will be found on the west side of Section 24.

In the North Braman Pool of Kay County, the Comar Oil Co.'s No. 1-W Brown, SW cor. SE, Section 16-29-1w, made 5,398 bbls. from the Wilcox sand. The sand record on this well is not available. Comar Oil Co.'s No. 2 Day, SE cor. NE SE, Section 20-29-1w, had the Siliceous lime at 3,392-3,424 feet, and started flowing 60 bbls. an hour. These two wells bolster the production of North Braman, and should increase it during the next week.

In the northwest extension of Tonkawa, the Skelly Oil Co.'s No. 4 Becker, NW cor. SE SW, Section 28 25-1w, is a failure in the Wilcox sand, with a hole full of water found at 4,336 feet.

In Creek County the Burke-Greis Oil Co. has a good well in No. 1 Scruggs, NW cor. NW, Section 21-17-8. Sand was found at 3,465-3,504 feet and the well flowed 600 bbls. after a shot of 20 quarts. This is the Wilcox sand.

The Magnolia Petroleum Co.'s No. 3 Vogler, NW cor. SE NE, Section 32-20-6, an old well drilled deeper in Pawnee County, had sand at 3,340-44 feet and made 431 bbls. the first 24 hours.

In the South Fairfax Pool of Osage County, the Phillips Petroleum Co.'s No. 1, SW cor. SW, Section 21-26-6, had the Burbank sand at 2,835-86 feet, a break at 2,886-90 feet, and the pay at 2,890-95 feet. The well was shot with 100 quarts and made 650 bbls.

Osage County

A. W. Brown's No. 13, NW cor. SW SE, Section 15-29-11, was shot with 120 quarts from sand at 943-80 feet, made 3 bbls. initial production; Phillips Petroleum Co.'s No. 6, NE cor. SW SW, Section 7-27-6, sand at 2,960-96 feet, shot with 70 quarts, 125 bbls.; Lewis Oil Co.'s No. 10, SW cor. SE SE, Section 21-26-6, sand at 2,916-44 feet, shot with 70 quarts, 325 bbls.; Prairie Oil & Gas Co.'s No. 13, NE cor. SE, Section 21-25-6, sand at 2,716-34 feet, shot with 50 quarts, 325 bbls.; Lewis Oil Co.'s No. 11, SW cor. NW, Section 29-25-8, sand at 2,483-2,508 feet, 190 bbls. naturally; the Indian Territory Illuminating Oil Co.'s No. 345, NW cor. SW SE, Section 22-25-11, dry and plugged at 1,857 feet; Devonian Oil Co.'s No. 14, SE cor. SW NW, Section 34-25-11, sand at 1,708-19 feet, shot with 120 quarts, 25 bbls.; Carter Oil Co.'s No. 2 Wills, SW cor. NW SE, Section 6-24-8, had sandy lime at 2,833 feet, swabbed 40 bbls., total depth, 2,840 feet, sandy lime, completed for 110 bbls.; Comar Oil Co.'s No. 1, SW cor. Section 6-23-9, sand at 2,448-55 feet, shot with 10 quarts, 35 bbls.; Barnsdall Oil Co. and others' No. 3, NE cor. NW, Section 2-21-8, sand at 2,482-2,503 feet, shot with 10 quarts, 110 bbls.; Skelly Oil Co.'s No. 2, CWL SE SE, Section 7-21-8, sand at 2,061-70 feet, made 400 bbls.

Phillips Petroleum Co.'s No. 12, SE cor. NE SW, Section 7-27-6, is a rig; Peters and others' No. 1, SW cor. NE, Section 20-27-6, rig; Gypsy Oil Co.'s No. 2, SE cor. Section 28-27-6, rig; Mid-Kansas Oil & Gas Co.'s No. 6, NE cor. SE, Section 33-27-6, rig; Lewis Oil Co.'s No. 5, SE cor. NW NE, Section 30-25-8e, drilling at 219 feet; Sinclair Oil Co.'s No. 1, NE cor. SW, Section 5-23-7, drilling at 350 feet.

Kay County

Tidal Oil Co.'s No. 2 Laughlin, C NW SE, Section 8-27-1w, Kay County, is a 16,000,000-foot gas well at 3,471 feet.

Comar Oil Co.'s No. 9 Harve, NE cor. Section 21-29-1w, is drilling at 370 feet; same company is rigging up for No. 10, NW cor. NE NE; Miller Brothers are spudding No. 1 Robinson, NW cor. SE, Section 1-27-3; Marland Oil Co. is rigging up No. 1-B Richmond, SE cor. NW, Section 1-26-2w; Prairie Oil & Gas Co. is rigging up to drill deeper No. 4 Smith "A," SE cor. Section 1-26-2w; Marland Oil Co.'s No. 1 North, SE cor. NE NE, Section 6-26-1w, is a rig; same company's No. 1 North, (No. 3 Lease) SW cor. SE SW, Section 6-26-1w, is a location; Barnsdall Oil Corp.'s No. 4 Liegerot, SW cor. NW, Section 28-25-1w, is setting 15½-inch casing at 250 feet. The company is building rig for No. 5, SE cor. SW NW, Section 28. Gypsy Oil Co.'s No. 5 Gardner, NW cor. SW, Section 28-25-1w, is a location.

Creek County

C. G. Tibbens' No. 2-A, SE cor. NW, Section 25-15-8, sand at 2,397-2,455 feet, shot with 90 quarts, 10 bbls; his No. 3 Hill, NW cor. SW, Section 35-15-8, sand at 2,475-2,515 feet, shot with 100 quarts, 7 bbls.; Gypsy Oil Co.'s No. 10 Ponds, NW cor. NW, Section 12-14-8, sand at 2,430-55 feet, shot with 60 quarts, 90 bbls.; C. G. Tibbens' No. 12 Johnson, CNL NW SE, Section 26-14-8, sand at 2,402-43 feet, shot with 80 quarts, 10 bbls.; McMan Oil Co.'s No. 1 Ingley, SW cor. SE, Section 9-14-10, sand at 3,345-56 feet, shot with 20 quarts, 10 bbls.; Atlantic Oil Producing Co.'s No. 2 Bear, NE cor. NW, Section 16-14-10, sand at 3,237-50 feet, 150 bbls.; also had 5,000,000 feet of gas from sand at 2,710-54 feet.

C. L. McMahon is spudding No. 1 Lewis, SE cor. SW, Section 7-19-9. Register Oil Co. is rigging up No. 1-A Murrell, SW cor. SE NW, Section 7-9-9. Olean Petroleum Co.'s No. 1 Atkins, NW cor. SW, Section 33-19-9, is a rig. New England Oil & Refining Co. is spudding No. 1 Perryman, NE cor. SW, Section 5-18-8. White Eagle Oil Co. and others are spudding No. 1 Sarwancke, SW cor. NW, Section 31-18-10. Holmes and others' No. 1 Eufaula, NW cor. Section 5-18-11, is drilling at 630 feet. W. J. Cole's No. 1 Green, SW cor. NW NE, Section 22-18-11, is a rig. Curtis Oil Co. is spudding in No. 1 Grayson, NE cor. SE, Section 5-18-12. Independent Oil & Gas Co. has a rig on ground for No. 2 Sneed, NE cor. NW, Section 30-17-10. Misner & Reesman's No. 2 Broadnox, CEL NW NW, Section 16-17-11, is a rig, and they are moving in machine for No. 3, NW cor. C. G. Tibbens' No. 33 Con-Mei-Sen-Nei, CSL N half Section 30-15-9, is a rig; his No. 1-B Posey,

TAMAULIPAS WILDCAT INCREASES OUTPUT TO 8,000 BBLS. DAILY

By George Blardone
Staff Correspondent, Mexican Fields

TAMPICO, Mex., Oct. 1.—With 11 wells completed in Mexican fields the past week, two in the northern fields can be recorded as producers, each one being good for 2,000 bbls. International Petroleum Co.'s No. 274, Lot 5, in Cacalilao, finished at 1,795 feet. The other producer was Mexican Petroleum Co.'s No. 9 Mendez at 1,990 feet.

In the south fields, Huasteca Petroleum Co.'s No. 77 Tierra Blanca has been suspended for the time being at a sub-sea level of 1,810 feet. It will remain shut down until such time as its production is required.

The Failures

In the northern fields, the failures follow: La Corona Petroleum Co.'s No. 186, Lot 4, Cacalilao, drilled into salt water at 2,119 feet. Cia. Pet. Francia Mexico, No. 13 Piedras, Panuco sector, did the same at 1,775 feet. Mexican Gulf Oil Co.'s No. 18 Piedras, same, is also salt water at 2,000 feet. National Lines' No. 84 Halcon is a dry hole at 2,505 feet. In the Topila sector, Ita Mex Oil Co.'s No. 23 La Mula is a dry hole at 2,615 feet; and The Texas Company may get a little production from its No. 1, Lot 19, Paciencia de Aguacate, which stopped the drill at 2,621 feet, but will plug back at 2,300 feet to test an upper stratum there. At Ebano, Mexican Petroleum Co.'s No. 43 La Dicha is a dry hole at 2,365 feet; and its No. 102, same, is also a duster at 2,505 feet.

In the south fields, Mexican Eagle Oil Co.'s No. 3 Mecapepec, a wildcat test north of its Furbero Field, is suspended indefinitely at 2,600 feet, where the drill stopped in a sandstone.

Good for 8,000 Bbls.

Mexican Gulf Oil Co. has commenced the exploitation of its well No. 30, which, drilled on the American International Fuel Co.'s Los Esteros property, in the State of Tamaulipas, is the only wildcat of worth drilled in Mexican fields thus far this year. It will be recalled that a conservative estimate of this well's production worth was placed at 3,500 bbls. when it was finished last July. The well is doing 8,000 bbls. The production is being handled through the Gulf company's recently completed 10-inch line to a loading station on the Tamesi River, from which point it finishes the journey to Tampico via barges and towboats. The oil is similar in character to other north fields production, say 12.5 gravity.

If Mexican Gulf's Tamaulipas well showed an increase over the estimate originally made for it, Rich Mex Oil Co.'s No. 10, Lot 26, Altamira, which borders on the Tamesi River, and is south by east from the Gulf's No. 30, is not so fortunate. This well came in some two weeks ago, as previously reported, good for 5,000 bbls., according to first estimates. Exploitation of the well, in barges, commenced late last week, but the "head" went off to around 500 bbls., which the well continues to do by heads. This Rich Mex test was finished at 2,168 feet, say 90 feet in the Tamasopa limestone. The Gulf's well in Los Esteros is a San Felipe well at 1,492 feet.

Lamentable Accident

No less than three men met their deaths by drowning in the Tamesi River as the week ended. Jack Haynes, well-known field superintendent of the Rich

(Continued on Page 94)

High Lights in Week's Operations

Shooting First Well in Seminole Pool and Extension of Upton County Area, Texas, Were Features

The most interesting development in the Seminole Pool in Oklahoma, the most important field at present, was the shooting of the Indian Territory Illuminating Co.'s No. 2 Reed, which was making 30 bbls. and increased to 1,070 bbls. in 15 hours. The production of the pool reached 34,235 bbls. The Independent-Garland's No. 2 Fixico, deepened 1 foot, increased 1,000 bbls. The Prairie's No. 3 Kinkaid, flowing 55 bbls. from 4,119 feet has not made any water.

An extension of the Upton County area 3½ miles by the Wentz Oil Corp.'s well making 2,000 bbls. was the most notable event in west Texas. The Cosden well in Ector County had 200 feet of oil in the hole. The Winkler County well got another showing and a well in Fisher County has a show. The Brown County area was extended and a well making 502 bbls. completed.

In the Texas Panhandle, the Empire company completed an 8,000-bbl. well, the Phillips company a 5,000-bbl. producer and the Canyon company a well making 190 bbls. an hour, all in Hutchinson County, while the Gulf Production Co. had a producer making 1,650 bbls. in the Pampa district of Gray County. The production of the Panhandle rose to 125,125 bbls. and is likely to show a substantial increase next week.

The Marland Pipe Line Co.'s policy in west Texas is to take all the oil possible under present market conditions and the company is still purchasing crude from all small producers, merely asking big concerns to find a market of their own. Due to the Panhandle crude there is practically no market for west Texas oil which has about twice as much sulphur content and lower gravity. Marland is still making some new connections if the wells are of moderate size, otherwise it will run the oil to storage for producers.

In the Gulf Coast, the Gulf company got a 2,500-bbl. well in the Hull Pool and, Boling Dome had a 1,000-bbl. producer.

The Simms-Sun Co.'s No. 1 Simmons, in the Lawson area of Arkansas, went through 11 feet of dry white sand with no showing of oil or water. It is being prepared for test.

Reports that the Gulf Refining Co. had found dome formations near Napoleon, La., attracted attention.

The Huasteca company completed No. 80 Tierra Blanca, south fields, Mexico, showing 75,000 bbls. initial. The wildcat in the State of Tamaulipas, increased from the original estimate of 3,500 bbls. to 8,000 bbls.

OKLAHOMA

The first well in the Seminole Pool of Seminole County, Oklahoma, has been shot. It is the Indian Territory Illuminating Oil Co.'s No. 2 Reed, NW cor. SW NE, Section 24-9-6, and it was making 30 bbls. daily before the shot. After a shot of 40 quarts, the well made 1,070 bbls. in 15 hours. This is an offset to the Carter Oil Co.'s No. 1 Carter, and to the Gypsy Oil Co.'s No. 1 Carter.

For the 24 hours ending 7 o'clock Tuesday morning of this week, the Seminole Pool produced 34,235 bbls. from all wells in the north, east and south group. The production of the Wilcox sand wells follows:

Amerada Petroleum Co. and Gardner Petroleum Co.'s No. 1 Killingsworth	2,997
Carter Oil Co.'s No. 1 Carter	1,440
Gypsy Oil Co.'s No. 1 Carter	1,671
Indian Territory Illuminating Oil Co.'s No. 2 Reed	*1,070
Tidal-Osage Oil Co.'s No. 2 Mahardy	4,245
Independent-Garland's No. 1 Fixico	7,660
Independent-Garland's No. 2 Fixico	5,634
Total Wilcox production	24,717

*For 15 hours.

One of the most important developments of the pool was the completion of the Mid-Continent Petroleum Corp.'s No. 1 Fixico, SE cor. SE, Section 14-9-6. This well extends production a half mile west, and a half mile north, and throws open for drilling considerable territory north and west of its location. The Mid-Continent Petroleum Corp.'s well had the Wilcox sand at 4,188 feet and penetrated it 15 feet, with a total depth of 4,203 feet. The first hour of flow, it made 117 bbls.

In the northwest extension of the Tonkawa Field, T. B. Slick's No. 1 Siler, SW cor. NW NE, Section 28-25-1w, is making 40 bbls. an hour from a total depth which has been variously reported. It is believed that the approximate depth of the well is 4,250 feet. It is reported making some water.

This well extends production a quarter mile to the north. It is a quarter mile north of The Texas Company's No. 2 Siler, SW cor. NE, Section 28-25-1w, which revived the interest in this section of the field.

SOUTHWEST TEXAS

SAN ANTONIO, Tex., Oct. 5.—Associated Oil Co. and Usher Carson's discovery well in the Carolina-Texas Field, Webb County, that went from 134 bbls. of oil daily to salt water when the size of choke was increased a week ago, is now making half oil and half water. With the size of the choke reduced it is believed it will come back to all oil.

Scott & Kercheval have ordered casing for their Billings test near Smily in Gonzales County that has 102 feet of oil-bearing formation, total depth 1,182 feet. It will test out the last of this week.

The Texas Company's No. 2 Webster, two locations east, which failed to make a well at the 2,600-foot horizon and again at 3,000 feet where there is a gas sand, is now drilling below 3,100 feet and will continue to 4,200 feet where there is another sand.

Crown Central Petroleum Corp. has purchased all of the Rydal Oil Corp.'s property in the Aviator and Schott Fields of Webb County in the Mirando Field, paying $400,000 of which $135,000 is cash and $265,000 to be paid out of 30 per cent of the oil. Crown Central and Rydal owned other acreage with production together and a couple of weeks ago Crown Central bought the Rydal's half interest in that at about the same price, that deal, however, including some acreage in the Breckenridge Field in north Texas.

The Texas Company has paid $50,000 of which $20,000 is cash and $30,000 to be paid in oil for 80 acres comprising Blocks 1 and 2 of Survey 81 in the north end of the Randado Pool in Jim Hogg County and just beyond present production.

GULF COAST

HOUSTON, Tex., Oct. 5.—Yount Lee Lee Oil Co.'s No. 14 McFaddin at Spindletop is flowing 5,000 bbls. at 2,800 feet through two chokers.

Gulf Production Co.'s No. 74 Phoenix, in the Hull Pool, is flowing 2,500 bbls. at 3,400 feet.

PENNSYLVANIA

TIONESTA, Pa., Oct. 5.—Rembold & Co. of Oil City, have drilled in, shot and connected their No. 6 well on Osten 18-acre lot, Dawson Run district, capable of producing 50 bbls. of oil daily, one of the best wells brought in by this company.

CALIFORNIA

LOS ANGELES, Calif., Oct. 5.—The Miley Petroleum Exploration Co. has just finished another deep zone well in the southwest extension of Huntington Beach doing 1,500 bbls. daily. The new well, No. 4 Pacific Electric, was finished at 4,007 feet. This is the fourth flowing well brought in from the deep sand in this extension but several more are anticipated within the next week or ten days.

BIG WELL IN MEXICO

By George Blardone

TAMPICO, Mexico, Oct. 2.—Huasteca Petroleum Co., in the south fields, has just completed its No. 80 Tierra Blanca, at a depth of 2,055 feet, rated good for 75,000 bbls. initial head. This well was drilled in at a sub-sea level of 1,884 feet, Tamasopa limestone. It is one of the shallowest wells yet drilled in the Tierra Blanca sector. The closed pressure is rated at 607 pounds. The other fields are devoid of special interest.

ARKANSAS

SHREVEPORT, La., Oct. 5.—Simms Oil Co. and Sun Oil Co.'s No. 1 Simmons, Section 6-18-13, in the Lawson area, Arkansas, cored 11 feet of dry white sand, topped at 2,933-44 feet. The sand showed no oil or water. Six-inch casing was cemented on top of the sand but because of a split joint 4½-inch casing is to be set and a test made.

PRAIRIE DENIES P. & R. RUMOR

In reply to a query from Dow, Jones & Co., of New York, regarding reports that the Prairie Oil & Gas Co. is planning an exchange offer for minority stocks Producers & Refiners Corp., President K. Moody said the Prairie Oil & Gas Co. will not make a new offer for the outstanding Producers & Refiners Corp. stock. The Prairie has held controlling interest in Producers & Refiners for several years.

NORTH CENTRAL TEXAS

Westbrook and Eastland Oil Co.'s No. 1 Hendricks in Winkler County had 500 feet of oil in the hole at 2,725 feet, with the pay just touched. This is 170 feet in big lime.

Cosden's No. 1-A Connell, Ector County, has 800 feet of oil at 3,475 feet. Both shut down for tankage.

EXAMINER APPROVES PRESENT OIL RATES

WASHINGTON, D. C., Oct. 4.—The report of Irvine L. Koch, examiner of the Interstate Commerce Commission, in the hearing of the rate case of the Galveston Commercial Association versus the Galveston, Harrisburg & San Antonio Railroad was made today to the commission.

The report is made of the examiner's conclusions and recommendations in the case, involving the fight between Texas ports and New Orleans for petroleum, as well as grain and other products, from northern Texas, Oklahoma and southern Kansas. The report is not binding and the commission may do what it wishes with it, either reject or accept it in part or in its entirety.

The examiner's recommendations were that rates on petroleum and petroleum products in export or coastwise movement from southern Kansas, Oklahoma, and north Texas to Galveston and other Texas ports and rates from points in north central Texas to New Orleans and Galveston and points taking the same rates should be found not unreasonable or unduly prejudicial.

OVER QUARTER BILLION IN GASOLINE TAXES

A total of $287,718,335 was collected in gasoline taxes in the United States from 1919 to 1925, inclusive, according to figures announced by the Bureau of Public Roads at Washington, D. C. The rapid growth of the gasoline tax as a source of revenue is indicated in that receipts increased from $1,022,514 in 1919, to $148,258,087 in 1925.

In 1919, only four states had a gasoline tax but in 1925 this list had swelled to 44 states and the District of Columbia. The tax collected by years was: 1919, 4 states, $1,022,514; 1920, 5 states, $1,363,902; 1921, 15 States, $5,382,111; 1922, 19 states, $12,703,088; 1923, 35 states, $38,566,338; 1924, 35 states and the District of Columbia, $80,422,295; 1925, 44 states and the District of Columbia, $148,258,087.

OIL REVENUE DECLINE MODERATES MEXICANS

By Charles E. Kern

Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Oct. 4.—The recent regulations affecting the Mexican petroleum industry, unlike former regulations, are signed by President Calles as well as by the Secretary of Industry, Commerce and Labor. The principal change made by the new order is to require a bond of 100,000 pesos for each well drilled on lands to which the title of the oil companies is not proven, instead of the "unlimited bond" required by the order of June 8. However, the most serious objection has not been removed, that the title of oil companies to oil lands would, in effect, be at the mercy of an administrative official.

This order refers only to provisional permits to drill on lands, regarding which the oil companies have not fully proven their title. According to a statement made to the press by Hilarion V. Branch, representative of the Huasteca Petroleum Co., it appears this company is obtaining drilling permits by proving its titles to the satisfaction of the legal staff of the Mexican Department of Industry, Commerce and Labor, thereby avoiding putting up the bond and fulfilling the other requirement set forth in the departmental orders.

While Mr. Morones, Secretary of Industry, Commerce and Labor, does not appear to be disposed to compromise with the oil companies and would like to carry the policy of nationalization out to its conclusions, there are other influences in the Calles Government, particularly Secretary of the Treasury Pani, who want to encourage the oil industry by more favorable legislation. The decline in revenues from oil production has reached serious proportions, and naturally the Secretary of the Treasury is much concerned on that account. Within the last few weeks, this influence appears to have had some success in bringing about a more liberal attitude toward the oil companies, as the companies have had less difficulty in obtaining drilling permits.

Panhandle Well Makes 8,000 Barrels

Empire Co. Completion Largest in Weeks. Phillips Co. Gets 5,000-Bbl. Producer and Canyon Co. 190 Bbls. Hourly

By C. D. Lockwood
Staff Correspondent, Texas Panhandle

An 8,000-bbl. well by the Empire Gas & Fuel Co., a 5,000-bbl. gusher by the Phillips Petroleum Co. on the Gordon lease, and another flowing 190 bbls. hourly by the Canyon Oil & Gas Co., all in Hutchinson County, combined with a 1,-650-bbl. completion by the Gulf Production Co. in the Pampa Pool of Gray County, and a few other excellent additions such as the McMan Oil Co.'s 65-bbl. an hour producer on the Johnson-Martin Gray property in Hutchinson County, all contributed toward a net gain of 1,275 bbls. in the entire Texas Panhandle district during the past week, and will probably cause a further substantial rise next week. The estimated daily production of 125,135 bbls. for the current 7-day period represents a new peak, although Hutchinson County gained only 465 bbls.

The storage and pipeline situation remains about the same and a number of the smaller independent producers as well as a few of the large companies show declines again this week which are attributable to the congestion. The completion of the new Santa Fe branch line to Isom in the heart of the Hutchinson County Field may help to some extent after the line is opened October 15, but it can hardly be expected to remedy the conditions more than partially. In the meantime, the Arctic Circle may be extended southward into Hutchinson County most any time now and judging by the brief taste of it a couple of weeks ago, some of the operators and pipeline companies are going to have a merry time trying to move their products. The Marland line is well protected with heaters and is covered with 48 inches of earth. These heaters have been tested out for the past two or three weeks and have been delivering the oil to the loading rack through a distance of 42 miles at a temperature of 110 degrees. At this rate it is believed that oil can be delivered successfully even in the coldest weather.

Made 8,420 Bbls.

The Empire Gas & Fuel Co.'s No. 5 Weatherly, in the NE cor. SE NE, Section 19, Block Y, Hutchinson County, was the most sensational well of many weeks in the entire Panhandle district when it increased by agitation and swabbing without shooting or drilling deeper to a maximum of 8,420 bbls. in one day from pay sand at 2,972-3,015 feet, total depth being 3,026 feet. The Phillips Petroleum Co.'s No. 2 Johnson-Gordon, in the NW cor. NE, Section 21, Block Y, came in for 5,000 bbls. following a 120-quart shot at 2,896-2,943 feet and the Canyon Oil & Gas Co.'s No. 6 J. A. Whittenburg, NE cor. SW SW, Section 12, Block Y, for 190 bbls. an hour at 2,745-50 feet.

The Alaska Petroleum Co.'s No. 1 Cockrell, in Section 2, Block B-3, D. & S. E. Survey, southeast of the main Block Y production, flowed 240 bbls. in the first five hours after a second shot which amounted to 520 quarts placed at 2,926-3,049 feet. At latest report, the well was doing 20 bbls. an hour.

Gulf Production Co.'s No. 20 Dial was flowing 40 bbls. at 2,923 feet and No. 22 was flowing 50 bbls. at 2,817 feet. Both of these wells are to be shot. No. 26 Dial flowed 30 bbls. while cleaning out at 3,023 feet. A location has been made for No. 38 Dial, 330 feet north and 350 feet east of the SW cor. SE, Section 90, Block Z, and cellar is being dug. No. 4 J. A. Whittenburg-B was cleaned out at 2,966 feet and flowed 75 bbls. after a shot.

Marland Oil Co.'s No. 1 River Bed is getting down close to the pay zone and will be watched with interest during the next week or two. Its elevation is 2,795 feet and it was drilling at 2,715 feet Sunday.

DAILY AVERAGE PRODUCTION OF THE AMARILLO DISTRICT

Week Ending October 2, 1926
Hutchinson County

Company—	Wells	Daily Average Last Week	This Week
Alaska Pet. Co.	1	75	50
Amerada Pet. Corp.	8	825	440
American Refining Co.	2	105	70
Apex Oil Co.	2	300	250
Badger Oil Co.	2	205	165
R. G. Barnum	1	0	0
Buffalo Oil Co.	1	30	35
Canadian River Oil Co.	4	485	475
Canyon Oil Co.	4	3,500	4,800
Center Dome Oil Co.	1	0	0
Centerfield Oil Co.	1	0	0
Coble-Whittenberg	3	775	800
Currie Bros. and J. R. Phillips	2	100	150
Cockrell & McIlroy	3	540	500
Delmar Oil Co.	1	35	35
Derby Oil Co.	4	1,375	1,325
Devonian Oil Co.	3	850	500
Dixon Creek Oil Co.	21	6,545	6,100
Double Five Oil Co.	1	75	50
Douglas Oil Co. and Cline	1	20	10
E. J. Dunnigan et al	3	1,175	1,150
Echo Oil Co.	3	1,175	1,125
Empire Gas & Fuel Co.	6	715	3,440
Fly-Blackburn Oil Co.	2	250	225
Gates Oil Co.	4	405	400
Goldelline Oil Co.	2	360	310
Golding & Phillips	1	0	0
Gulf Prod. Co. and Panhandle Ref. Co.	32	6,040	7,295
Gulf Production Co.	18	4,460	4,325
Heywood et al	2	0	0
J. K. Hughes Dev. Co.	12	2,100	2,150
Holmes, Currie & McKnight	2	350	320
W. H. Holmes	1	235	250
Hutchinson Co. Oil Co.	1	0	0
Dan A. Japhet	3	605	575
J. H. Lenix	1	0	0
Lenix & Patterson	1	270	285
Lucky 10 Oil Co.	3	1,150	1,100
Marland Oil Co.	34	18,015	17,020
Midwest Exploration Co.	5	350	335
Minnehoma Oil Co. and Kistler	1	235	180
McMan Oil & Gas Co.	15	6,355	6,920
McIlroy & Herring	4	450	435
S. D. and W. W. McIlroy	5	1,850	1,535
McIlroy Bros. et al	2	340	320
J. H. Middleton	3	70	55
Murchison & Fain	1	360	365
Newby Oil Co.	1	55	45
New Domain Oil Co.	3	160	110
Phillips & Heywood	2	2,140	2,200
J. R. Phillips	1	25	20
Phillips Petroleum Co.	61	20,405	18,420
Prairie Oil & Gas Co.	20	3,510	2,910
Relief Oil Co.	3	1,250	1,410
Riley & Holmes	1	360	340
Roxana Pet. Corp.	8	2,145	2,085
Ryan Pet. Co.	3	530	490
Skelly Oil Co.	13	6,750	7,575
Sklatex Oil Co.	4	875	900
J. L. Smith	2	275	230
Smith & Byrum	2	400	350
Spring Creek Oil Co.	4	825	720
Sunny Jim Oil Co.	5	650	510
Sunburst Oil Co.	2	1,300	1,200
Sunrise Oil Co.	1	0	10
Travelers Oil Co.	2	660	640
Triangle Oil Co.	2	2,820	2,600
J. D. Ward	1	65	60
J. D. Ward et al	1	55	50
Westex Oil Co.	7	3,570	3,700
White Eagle Oil & Ref. Co.	16	2,600	2,500
J. O. Whittington	1	0	0
Total Hutchinson Co.	403	114,950	115,415
Average per well		290	286
Carson County			
Amarillo Oil Co.	1	0	0
American Ref. Co.	7	535	510
Gates Oil Corp.	1	10	10
Gulf Production Co.	14	360	405
Marland Oil Co.	12	2,665	2,160
Roxana Pet. Corp.	1	125	400
W. W. Silk et al	3	90	120
Skelly Oil Co.	2	85	90
Sunny Jim Oil Co.	2	45	40
The Texas Company	11	320	285
Total Carson County	54	4,135	4,020
Average per well		76	74
Gray County			
Empire Gas & Fuel Co.	1	10	10
Gulf Production Co.	2	95	720
Magnolia Pet. Co.	2	50	70
McMan Oil & Gas Co.	1	110	410
Prairie Oil & Gas Co.	3	1,035	1,080
Wilcox-Pampa Oil Co.	7	2,955	2,995
The Texas Company	1	15	0
Total Gray County	17	4,270	5,285
Average per well		285	311
Potter County			
Amarillo Oil Co.	1	30	25
Wheeler County			
Gibson Oil Corp.	2	150	150
Continental Oil Co.	3	275	200
Mid-Kansas Oil & Gas Co.	1	25	25
Midwest Exploration Co.	3	15	15
Total Wheeler County	8	475	390
Average per well		59	48
Grand total Panhandle	482	123,860	125,135
Average per well		261	259
Average per well last week		261	
Total Panhandle four weeks ago	399	116,101	
Average per well four weeks ago		291	

RECAPITULATION

County—	First Reports	Drlg. Wells	S.D.
Armstrong	0	1	0
Carson	4	37	1
Collingsworth	0	3	1
Dallam	0	0	2
Donley	0	0	1
Gray	0	53	22
Hansford	0	1	1
Hall	0	0	0
Hartley	0	3	2
Hemphill	0	4	2
Hutchinson	15	367	32
Lipscomb	0	4	0
Moore	0	11	2
Ochiltree	0	3	1
Potter	0	5	0
Randall	0	0	1
Roberts	0	3	3
Sherman	0	2	1
Wheeler	0	17	5
Total	19	549	77

Texas Panhandle Completions
Hutchinson County

Amerada Petroleum Corp.'s No. 3 J. A. Whittenburg-A was shot with 50 quarts at 2,914-65 feet, making 90 bbls., and was re-shot with 300 quarts at 2,900-65 feet, making 100 bbls.; No. 5 J. A. Whittenburg-B was re-shot with 300 quarts at 2,969-3,032 feet, making 150 bbls. Bozo Oil Co. abandoned the rig for No. 1 W. B. Haile.

Canyon Oil & Gas Co.'s No. 6 J. A. Whittenburg, Section 12, Block Y, was flowing 190 bbls. an hour at 2,730-40 feet, total depth 2,750 feet. Currie and others abandoned the location for their No. 1 Smith, NW cor. NE, Section 10, Block Y. This is a little over a quarter of a mile south of production. J. K. Hughes Development Co.'s No. 16-A Kingsland, Section 6, Block Y, flowed 140 bbls. naturally at 2,835-2,954 feet; No. 4 Kingsland-B, Section 6, Block B-4, flowed 150 bbls. naturally at 2,705-82 feet; No. 5 Kingsland-B made 100 bbls. after a 60-quart shot at 2,708-68 feet.

Dan Japhet's No. 3 Smith, Section 11, Block Y, flowed 200 bbls. from pay at 2,688-2,740 feet. S. D. and W. W. McIlroy's No. 8 Smith, Section 14, Block Y, was flowing 50 bbls. an hour following a 300-quart shot at 2,8752,955 feet. McMan Oil & Gas Co.'s No. 3 Johnson-Martin Gray, SW SE NE, Section 21, Block Y, flowed 65 bbls. an hour naturally at 2,894-2,953 feet. Midwest Exploration Co.'s No. 1 Smith-Dick, Section 5, Block Y, was shut in at 2,650 feet, making 30,000,000 feet of gas; No. 1 Smith-Tyrell made 200 bbls. at 2,687-2,744 feet.

Phillips Petroleum Co.'s No. 3 Johnson-Gordon, SE cor. N half NE, Section 21, Block Y, was shot with 80 quarts at 2,932-63 feet and was flowing 55 bbls. an hour; No. 2 Johnson-Gordon, NW cor. NE, same section, was shot with 120 quarts at 2,896-2,943 feet, total depth 2,952 feet, and flowed 5,000 bbls. afterward; No. 3, SE cor. NE, same section, was flowing 30 bbls. an hour naturally at 2,915-25 feet, total depth 2,-935 feet. Phillips Petroleum Co.'s No. 3 Whittenburg-Jerry, SE SE, Section 13, Block Y, was swabbing 200 bbls. daily at 2,783-2,825 feet. Skelly Oil Co.'s No. 1 J. E. Pritchard, Section 3, Block B-4, flowed 165 bbls. at 2,785-2,806 feet. Westex Oil Co.'s No. 6 J. A. Whittenburg, Section 13, Block Y, flowed 300 bbls. at 2,825-2,928 feet.

Moore County

Prairie Oil & Gas Co.'s No. 2 Sneed

(Continued on Page 354)

FARMINGTON, NEW MEXICO, AREA REPORTS RENEWED FIELD ACTIVITY

FARMINGTON, N. Mex., Oct. 2.—The Portage Oil & Gas Syndicate, operating on the Glade structure, Section 34-30-13, 6 miles northeast of Farmington, has succeeded in sidetracking the joint of casing and string of tools in the bottom of the old hole and has the 8¼-inch casing run well toward the bottom, but at the last report had not got it entirely down. If this is not successful it may be cemented in and make a water shutoff where it is or 6-inch casing may be run, though it is not desired to do the latter if it can be avoided. At any rate it will be only a short time until the drill will be testing out new levels on this structure.

W. R. Childers, operating in the Ute Pasture district, Section 24-31-16, has succeeded in loosening the casing which was dropped while being run and buckled a short distance at the bottom. As it was only a short part at the bottom that bent it was the intention to drill it out if it could not be loosened, but it now seems certain it can be successfully pulled. This location is about 20 miles northwest of Farmington. Another drilling campaign in this district is about ready to be announced if street reports are correct.

The Congress Oil Co., operating in the Kutz Canon district, Section 34-29-11, is still closed down awaiting casing.

The Southwestern Development Co., drilling on the Atteberry place, 6 miles north of Aztec, Section 24-31-11, for which C. S. Ringle had the contract to drill to a depth of 1,200 feet, has completed this contract and work has been suspended.

The Ross-Bloomfield Royalties Co., operating in the Bloomfield district, Section 11-29-11, is drilling at a depth of about 2,360 feet and making slow progress as it is drilling inside a 4-inch casing.

J. F. Wolking and associates of Albuquerque, who will operate in this field under the name of the Hagan Oil Co., are arranging to drill in the old Aztec fairgrounds and expect to spud in by the end of this week.

The Union Oil & Mining Co., operating in the Blanco district, Section 8-29-9, was still fishing at the last reports at a depth around 3,000 feet.

E. J. Miley, operating on the Red Mesa structure, Section 32-33-12, is drilling at a little deeper than 1,000 feet, with a good flow of gas and is making satisfactory progress and expects to reach the Dakota sands before hard freezing weather sets in as both cold and snow may interfere with operations in this district.

Arrangements are in progress for the spudding in of two more wells on the Red Mesa structure and it is expected this will be done before the end of October.

A group of operators that have associated for development work in this field and part of whom are the owners of Tract D in the Ute Pasture, which was sold at the last Navajo lease sale, have been here. In the group are F. H. Gose and James I. Harvey of Wichita Falls, Tex.; J. A. Hodge of Fort Worth, Tex.; F. P. Powell and wife of Dallas, Tex.; and F. L. Harvey and Frank Staplin of Santa Fe.

Upton County Area Extended by Wentz

Well Making 2,000 Bbls. Three and One-Half Miles From Production. Ector, Fisher and Winkler County Wells Features

By C. D. Lockwood
Staff Correspondent, North Texas Fields

FORT WORTH, Tex., Oct. 4.—An extension of 3½ miles to the producing territory in Upton County west Texas, the completion of another well on the Dixie-Hughes lease in the same county for 1,152 bbls. of pipeline oil, the discovery of 200 feet of oil in J. S. Cosden's Ector County wildcat known as No. 1-A Connell, the discovery of another oil showing in Winkler County's famous wildcat test at a depth of 2,748 feet, a showing of live oil in a Fisher County well, just west of Jones County, a northwesterly extension to the Dunn-Stover Pool in Brown County making more than 700 bbls. daily, and a record completion in the Fry Pool near Trinity in the same county which was good for 502 bbls. initially, were some of the achievements of north and west Texas operators during the past week.

The Upton County extension caused a wild flurry of lease buying, which caused the expenditure of $108,000 for holdings in the vicinity, according to one operator's tabulation. The Wentz Oil Corp. of Ponca City, Okla., caused all of this excitement when its No. 1 Sherk, in the NW cor. SE of Section 35, Block 1, M. K. & T. Survey, located about 2 miles west and the same distance north of the town of Hurdle, and about 3½ miles east of production on the Burleson and Della Bowen leases, came in at midnight September 30 estimated at 2,000 bbls. daily. The well had to be shut in because of insufficient storage, and the oil broke through between the 6 and 8-inch and also behind the 8-inch. When the 6-inch was opened up later, the well flowed by heads at the rate of 170 bbls. in 19 hours, and there was 700 feet of water in the hole. This water, however, is probably due to faulty casing seat. Monday the owners were preparing to run 5-inch with packer, and the exact worth of this particular well will not be known for several days. However, it definitely proved up considerable territory and adds further evidence that the west Texas district is destined to develop into one of the greatest fields in the country.

The Wentz Oil Corp. purchased this property from Johnston & McCamey, veteran west Texas wildcatters, only recently. The consideration was said to have been about $25,000 for approximately a section of land, scattered as shown on the accompanying map. After the well came in, the Atlantic Oil Producing Co. bought a half-interest in three 80-acre tracts, including one offset for $40,000 and two free wells. Roxana Petroleum Corp. paid $20,000 for the southeast quarter of Section 31, a mile east and half a mile north of the well, and The Texas Company and Roxana are reported to have paid as high as $200 an acre for parts of Section 21, a couple of miles east of the producer. The Union Land Co. is going to drill in the southwest corner of that section and will start up right away. The Atlantic Oil Producing Co. is starting an offset to the west of the Wentz discovery, and the Gulf Production company has located its No. 1 Sherk-E directly north of it, in the SW cor. NE of Section 35, a 330 foot location. The rig is now building. The northwest quarter of Section 35 was still open last Saturday, the Sherk estate having refused an offer of $500 an acre in cash and $250 in oil.

Ector County Wildcat

Of perhaps greatest importance to the west Texas wildcatting industry was the report by wire Monday afternoon that the J. S. Cosden No. 1-A Connell in Ector County had 200 feet of oil in the hole at 3,465-75 feet, with some gas. This will mean a considerable shift in the wildcat play north of Crane County. This well is in the NE of Section 13, Block 16, near the south line of the county. It had a small showing of oil at 3,435 feet, making about two-thirds of a bailer.

Westbrook and Eastland Oil Co.'s No. 1 Hendricks in Winkler County was reported late Monday to have 250,000 feet of gas and 100 feet of oil in the hole at 2,748 feet and to have been shut down for orders.

In northern Fisher County, the Ideal Oil Co.'s No. 1 W. F. Martin, in the NW of Section 113, Block 1, T. & T. C. Survey, topped lime at 3,345 feet and bailed 4 gallons of live oil, with a show of gas. The 6-inch was set at 3,000 feet and the well was drilling at 3,390 feet.

The Jones County well, Phillips Petroleum Co.'s No. 1 Winters, produced as follows from September 22 to 29, inclusive: 912 bbls., 865 bbls., 840 bbls., 677 bbls., 805 bbls., 645 bbls., 807 bbls., 620 bbls.

In Winkler County, Brandon & McCamey's No. 1 Kloh & Rumsey, SW cor. Section 11, Block 46, T. & P. Survey, had a hole full of salt water at 3,290 feet and was shut down.

Brown County Extension

In Brown County, the Humble Oil & Refining Co.'s No. 2 Hickman produced 737 bbls. at 1,190-1,235 feet. It extends production a location to the northwest. In the Fry Pool, near Trinity, William Lester's No. 5 M. E. Fry was a sensational producer for this area, flowing 502 bbls. the first 24 hours and 488 bbls. on the fifth day.

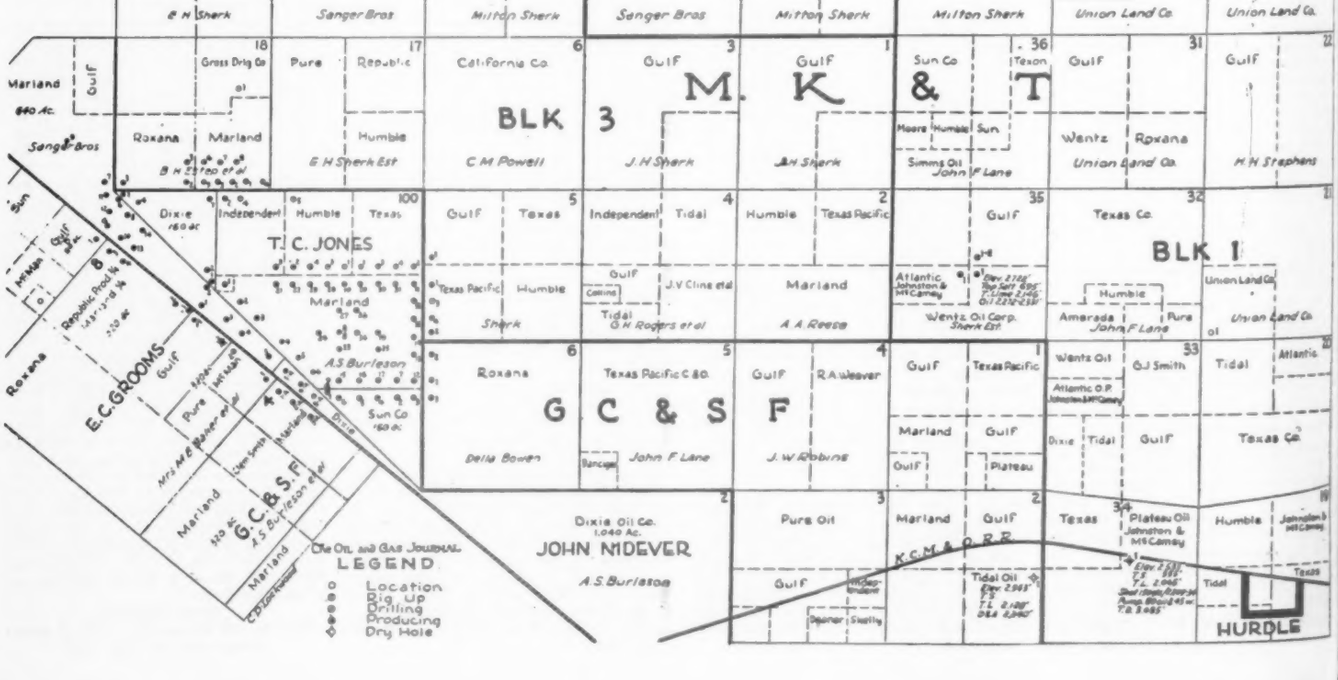
In Archer County, the Simms Oil Co. and Burns' No. 1 J. H. Turbeville-A in the SE of Section 142, Robert Carson Survey, was swabbing 200 bbls. daily at 1,498-1,503½ feet after the plug was drilled out. Marland Oil Co.'s No. 1 Turbeville was estimated at 500 bbls. more at 1,493-1,525 feet.

NORTH CENTRAL TEXAS PRODUCTION ESTIMATED
Week Ending October 2, 1926

	This Week	Last Week
Ranger District—		
Brown County	12,642	12,...
Callahan County	4,217	4,...
Coleman County	1,770	1,...
Comanche County	1,780	1,...
Palo Pinto County	432	...
Ranger County	5,463	5,...
Shackelford County	10,123	10,...
Stephens County	11,082	11,...
Total Ranger District	47,514	47,...
Wichita Falls District—		
Electra	18,944	19,...
Burkburnett	11,656	11,...
Iowa Park	4,311	4,...
Archer County	32,227	30,...
Clay County	667	...
Wilbarger County	14,126	14,...
Montague County	8,329	8,...
Young County	8,312	8,...
Jack County	215	...
Throckmorton County	1,894	1,...
Baylor County	142	...
Cooke County	471	...
Total Wichita Falls Dist.	100,804	99,...
West Texas District—		
Big Lake Field	29,252	28,...
Crane County	712	...
Crockett County	1,138	1,...
Howard County	401	...
Mitchell County	3,467	3,...
Scurry County	59	...
Upton County	9,826	8,...
Jones County	790	...
Total West Texas Dist.	45,546	44,...
Grand total	193,864	191,...
Increase	2,114	

Increases of 1,100 bbls. in Upton County, 400 bbls. in the Big Lake Field of Reagan County, 1,483 bbls. in Archer County, 539 bbls. in Brown County, and smaller gains in Montague, Cooke and a few other counties accounted for the net gain of 2,114 bbls. daily during the past week in the whole of north and west Texas, outside of the Panhandle. It is interesting to note that Montague County again established a new peak, this week having passed Young County, and

(Continued on Page 352)



J. H. Struth, petroleum economist and Associate Editor of Oil Trade, in The New York Times, issue of Sunday, August 22, 1926, states:

". . . . . At the present rate of cracking unit installations in every part of the United States, the writer is willing to predict that we shall be getting 21 gallons of gasoline out of every barrel of crude refined, or an average of 50 per cent by 1928."

The Dubbs Process is doing in 1926 what others predict may be possible in 1928

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BETTER BE SAFE THAN SORRY

Seminole Pool Growing in Interest

Independent-Garland Well Increases Output With Deeper Drilling. Prairie Completion Free From Water

By J. L. Dwyer
Staff Correspondent, Oklahoma Fields

The only competition which the Seminole Pool, in Oklahoma, experienced in the way of attracting attention of the oil industry was the World's Series baseball games at St. Louis. The proximity of the Mound City to Tulsa caused many officials to make the trip.

The Seminole Pool continues to grow and to occupy a more commanding position. Its influence upon the market is bound to be felt before very many more wells are drilled in.

There were two important events in Seminole during the past week. First the Independent Oil & Gas Co. and R. F. Garland's No. 2 Fixico, SE cor. SW NE, Section 26-9-6, was drilled 1 foot deeper, and the rate of flow increased 1,000 bbls. daily. This well is now only 2 feet in the sand, and it is producing better than 5,600 bbls. daily. The other important occurrence of the past week was the drilling in of the Prairie Oil & Gas Co.'s No. 3 Kincaid, SE cor. SE, Section 33-10-6. This well found the Hunton lime at 4,039 feet, and the pay in the lime was found at 4,108 feet. The well has a total depth of 4,119 feet, and is flowing at the rate of 55 bbls. an hour. It has not made any water. The only other well in the north end of the field which has been free from the intrusion of water is the Mid-Continent Petroleum Corp.'s No. 1 Grayson, NW cor. SW SW, Section 34-10-6. This well is a quarter-mile north and a location east of the Prairie's new well, and the fact that these wells are free from water indicates that the locality west and south of a line drawn between these wells will be highly productive as it is above the water level.

Three Groups of Production

From an inspection of the logs of completed wells in the field it is apparent that there will be three groups of production. The north group, in Township 10-6, the east group in Section 24-9-6, and the south group around the Independent Oil & Gas Co. and R. F. Garland's lease in Section 26-9-6.

The first group are producing from the Hunton lime only. In both of the other two groups of wells, production has been found in the Hunton and Wilcox sands. The Wilcox sand has never been penetrated in the north group of wells, and many believe that before the final chapters of Seminole history are written, the Wilcox will yield some oil in that region. Although not enough wells have reached the Wilcox sand to permit any study of comparative production in the same location, it is thought unlikely that both of these horizons will produce in the same spots. This theory is based upon past experience only, and not upon Seminole.

Seminole Production

The Seminole Pool made 32,380 bbls. on Sunday of this week from a total of 74 wells. Out of this amount, six Wilcox sand wells made 22,850 bbls. distributed as follows:

Independent Oil & Gas Co. and R. F. Garland's No. 1 Fixico	7,361
No. 2 Fixico	5,612
Amerada Petroleum Co. and Gardner Petroleum Co.'s No. 1 Killingsworth	3,160
Carter Oil Co.'s No. 1 Carter	1,455
Prairie Oil Co.'s No. 1 Carter	1,877
Tidal-Osage Oil Co.'s No. 1 Mahardy	3,385
Total	22,850

Carter Gets Good Well

During the week the Carter Oil Co.'s No. 1 Carter, SW cor. NE NE, Section 34-9-6, had the Wilcox sand at 4,155-70 feet and made 1,455 bbls. This well is a north offset to the Indian Territory Illuminating Oil Co.'s No. 2, which is a very light well in the Wilcox sand making 30 bbls. The finding of a good well immediately north of the light I. T. I. well seems to indicate that the Wilcox production in this part of Seminole will be found on the west side of Section 24.

In the North Braman Pool of Kay County, the Comar Oil Co.'s No. 1-W Brown, SW cor. SE, Section 16-29-1w, made 5,398 bbls. from the Wilcox sand. The sand record on this well is not available. Comar Oil Co.'s No. 2 Day, SE cor. NE SE, Section 20-29-1w, had the Siliceous lime at 3,392-3,424 feet, and started flowing 60 bbls. an hour. These two wells bolster the production of North Braman, and should increase it during the next week.

In the northwest extension of Tonkawa, the Skelly Oil Co.'s No. 4 Becker, NW cor. SE SW, Section 28 25-1w, is a failure in the Wilcox sand, with a hole full of water found at 4,336 feet.

In Creek County the Burke-Greis Oil Co. has a good well in No. 1 Scruggs, NW cor. NW, Section 21-17-8. Sand was found at 3,465-3,504 feet and the well flowed 600 bbls. after a shot of 20 quarts. This is the Wilcox sand.

The Magnolia Petroleum Co.'s No. 3 Vogler, NW cor. SE NE, Section 32-20-6, an old well drilled deeper in Pawnee County, had sand at 3,340-44 feet and made 431 bbls. the first 24 hours.

In the South Fairfax Pool of Osage County, the Phillips Petroleum Co.'s No. 1, SW cor. SW, Section 21-26-6, had the Burbank sand at 2,835-86 feet, a break at 2,886-90 feet, and the pay at 2,890-95 feet. The well was shot with 100 quarts and made 650 bbls.

Osage County

A. W. Brown's No. 13, NW cor. SW SE, Section 15-29-11, was shot with 120 quarts from sand at 943-80 feet, made 3 bbls. initial production; Phillips Petroleum Co.'s No. 6, NE cor. SW SW, Section 7-27-6, sand at 2,960-96 feet, shot with 70 quarts, 125 bbls.; Lewis Oil Co.'s No. 10, SW cor. SE SE, Section 21-26-6, sand at 2,916-44 feet, shot with 70 quarts, 325 bbls.; Prairie Oil & Gas Co.'s No. 13, NE cor. SE, Section 21-25-6, sand at 2,716-34 feet, shot with 50 quarts, 325 bbls.; Lewis Oil Co.'s No. 11, SW cor. NW, Section 29-25-8, sand at 2,483-2,508 feet, 190 bbls. naturally; the Indian Territory Illuminating Oil Co.'s No. 345, NW cor. SW SE, Section 22-25-11, dry and plugged at 1,857 feet; Devonian Oil Co.'s No. 14, SE cor. SW NW, Section 34-25-11, sand at 1,708-19 feet, shot with 120 quarts, 25 bbls.; Carter Oil Co.'s No. 2 Wills, SW cor. NW SE, Section 6-24-8, had sandy lime at 2,833 feet, swabbed 40 bbls., total depth, 2,840 feet, sandy lime, completed for 110 bbls.; Comar Oil Co.'s No. 1, SW cor. Section 6-23-9, sand at 2,448-55 feet, shot with 10 quarts, 35 bbls.; Barnsdall Oil Co. and others' No. 3, NE cor. NW, Section 2-21-8, sand at 2,482-2,503 feet, shot with 10 quarts, 110 bbls.; Skelly Oil Co.'s No. 2, CWL SE SE, Section 7-21-8, sand at 2,061-70 feet, made 400 bbls.

Phillips Petroleum Co.'s No. 12, SE cor. NE SW, Section 7-27-6, is a rig; Peters and others' No. 1, SW cor. NE, Section 20-27-6, rig; Gypsy Oil Co.'s No. 2, SE cor. Section 28-27-6, rig; Mid-Kansas Oil & Gas Co.'s No. 6, NE cor. SE, Section 33-27-6, rig; Lewis Oil Co.'s No. 5, SE cor. NW NE, Section 30-25-8e, drilling at 219 feet; Sinclair Oil Co.'s No. 1, NE cor. SW, Section 5-23-7, drilling at 350 feet.

Kay County

Tidal Oil Co.'s No. 2 Laughlin, C NW SE, Section 8-27-1w, Kay County, is a 16,000,000-foot gas well at 3,471 feet.

Comar Oil Co.'s No. 9 Harve, NE cor. Section 21-29-1w, is drilling at 370 feet; same company is rigging up for No. 10, NW cor. NE NE; Miller Brothers are spudding No. 1 Robinson, NW cor. SE, Section 1-27-3; Marland Oil Co. is rigging up No. 1-B Richmond, SE cor. NW, Section 1-26-2w; Prairie Oil & Gas Co. is rigging up to drill deeper No. 4 Smith "A," SE cor. Section 1-26-2w; Marland Oil Co.'s No. 1 North, SE cor. NE NE, Section 6-26-1w, is a rig; same company's No. 1 North, (No. 3 Lease) SW cor. SE SW, Section 6-26-1w, is a location; Barnsdall Oil Corp.'s No. 4 Liegerot, SW cor. NW, Section 28-25-1w, is setting 15½-inch casing at 250 feet. The company is building rig for No. 5, SE cor. SW NW, Section 28. Gypsy Oil Co.'s No. 5 Gardner, NW cor. SW, Section 28-25-1w, is a location.

Creek County

C. G. Tibbens' No. 2-A, SE cor. NW, Section 25-15-8, sand at 2,397-2,455 feet, shot with 90 quarts, 10 bbls; his No. 3 Hill, NW cor. SW, Section 35-15-8, sand at 2,475-2,515 feet, shot with 100 quarts, 7 bbls.; Gypsy Oil Co.'s No. 10 Ponds, NW cor. NW, Section 12-14-8, sand at 2,430-55 feet, shot with 60 quarts, 90 bbls.; C. G. Tibbens' No. 12 Johnson, CNL NW SE, Section 26-14-8, sand at 2,402-43 feet, shot with 80 quarts, 10 bbls.; McMan Oil Co.'s No. 1 Ingley, SW cor. SE, Section 9-14-10, sand at 3,345-56 feet, shot with 20 quarts, 10 bbls.; Atlantic Oil Producing Co.'s No. 2 Bear, NE cor. NW, Section 16-14-10, sand at 3,237-50 feet, 150 bbls.; also had 5,000,000 feet of gas from sand at 2,710-54 feet.

C. L. McMahon is spudding No. 1 Lewis, SE cor. SW, Section 7-19-9. Register Oil Co. is rigging up No. 1-A Murrell, SW cor. SE NW, Section 7-9-9. Olean Petroleum Co.'s No. 1 Atkins, NW cor. SW, Section 33-19-9, is a rig. New England Oil & Refining Co. is spudding No. 1 Perryman, NE cor. SW, Section 5-18-8. White Eagle Oil Co. and others are spudding No. 1 Sarwancke, SW cor. NW, Section 31-18-10. Holmes and others' No. 1 Eufaula, NW cor. Section 5-18-11, is drilling at 630 feet. W. J. Cole's No. 1 Green, SW cor. NW NE, Section 22-18-11, is a rig. Curtis Oil Co. is spudding in No. 1 Grayson, NE cor. SE, Section 5-18-12. Independent Oil & Gas Co. has a rig on ground for No. 2 Sneed, NE cor. NW, Section 30-17-10. Misner & Reesman's No. 2 Broadnox, CEL NW NW, Section 16-17-11, is a rig, and they are moving in machine for No. 3, NW cor. C. G. Tibbens' No. 33 Con-Mei-Sen-Nei, CSL N half Section 30-15-9, is a rig; his No. 1-B Posey,

TAMAULIPAS WILDCAT INCREASES OUTPUT TO 8,000 BBLS. DAILY

By George Blardone
Staff Correspondent, Mexican Fields

TAMPICO, Mex., Oct. 1.—With 11 wells completed in Mexican fields the past week, two in the northern fields can be recorded as producers, each one being good for 2,000 bbls. International Petroleum Co.'s No. 274, Lot 5, in Cacalilao, finished at 1,795 feet. The other producer was Mexican Petroleum Co.'s No. 9 Mendez at 1,990 feet.

In the south fields, Huasteca Petroleum Co.'s No. 77 Tierra Blanca has been suspended for the time being at a sub-sea level of 1,810 feet. It will remain shut down until such time as its production is required.

The Failures

In the northern fields, the failures follow: La Corona Petroleum Co.'s No. 186, Lot 4, Cacalilao, drilled into salt water at 2,119 feet. Cia. Pet. Francia Mexico, No. 13 Piedras, Panuco sector, did the same at 1,775 feet. Mexican Gulf Oil Co.'s No. 18 Piedras, same, is also salt water at 2,000 feet. National Lines' No. 84 Halcon is a dry hole at 2,505 feet. In the Topila sector, Ita Mex Oil Co.'s No. 23 La Mula is a dry hole at 2,615 feet; and The Texas Company may get a little production from its No. 1, Lot 19, Paciencia de Aguacate, which stopped the drill at 2,621 feet, but will plug back at 2,300 feet to test an upper stratum there. At Ebano, Mexican Petroleum Co.'s No. 43 La Dicha is a dry hole at 2,365 feet; and its No. 102, same, is also a duster at 2,505 feet.

In the south fields, Mexican Eagle Oil Co.'s No. 3 Mecapepec, a wildcat test north of its Furbero Field, is suspended indefinitely at 2,600 feet, where the drill stopped in a sandstone.

Good for 8,000 Bbls.

Mexican Gulf Oil Co. has commenced the exploitation of its well No. 30, which, drilled on the American International Fuel Co.'s Los Esteros property, in the State of Tamaulipas, is the only wildcat of worth drilled in Mexican fields thus far this year. It will be recalled that a conservative estimate of this well's production worth was placed at 3,500 bbls. when it was finished last July. The well is doing 8,000 bbls. The production is being handled through the Gulf company's recently completed 10-inch line to a loading station on the Tamesi River, from which point it finishes the journey to Tampico via barges and towboats. The oil is similar in character to other north fields production, say 12.5 gravity.

If Mexican Gulf's Tamaulipas well showed an increase over the estimate originally made for it, Rich Mex Oil Co.'s No. 10, Lot 26, Altamira, which borders on the Tamesi River, and is south by east from the Gulf's No. 30, is not so fortunate. This well came in some two weeks ago, as previously reported, good for 5,000 bbls., according to first estimates. Exploitation of the well, in barges, commenced late last week, but the "head" went off to around 500 bbls., which the well continues to do by heads. This Rich Mex test was finished at 2,168 feet, say 90 feet in the Tamasopa limestone. The Gulf's well in Los Esteros is a San Felipe well at 1,492 feet.

Lamentable Accident

No less than three men met their deaths by drowning in the Tamesi River as the week ended. Jack Haynes, well-known field superintendent of the Rich

(Continued on Page 94)

NW cor. NE NE, Section 31-15-9, is drilling at 690 feet.

Tulsa County

Holmes and others' No. 1 Bell, CNL NW SW, Section 14-19-10, Tulsa County, had sand at 1,788-1,806 feet. It was shot with 90 quarts and started at 25 bbls. Franchot and Mid-Continent Petroleum Co.'s No. 11 Soffie, CEL SW NW, Section 22-17-13, is dry and abandoned at 1,596 feet.

Superior Oil Co. and Swift are rigging up machine for No. 1-A Burnett, NE cor. NW NW, Section 7-19-10. Glidden Oil Co. is rigging up No. 1 River Bed, CWL NW SE, Section 15-19-11. Cato Oil & Gas Co.'s No. 4 Cato, C SE NE, Section 29-19-11, is drilling at 1,200 feet. Sand Springs Home has rig on ground for No. 2 Jefferson, NE cor. SE NE, Section 29. Munn Brothers' No. 1 Franklin, SW cor. Section 36-19-11, is drilling at 1,185 feet. Straugh-Edwards' No. 2 Burgess, NE cor. SE, Section 36-19-11, is a rig.

Okmulgee County

Winemiller's No. 8 Welch, SW cor. NW SW, Section 13-16-12, was dry and abandoned at 2,587 feet; Anglo-Tex Oil Co.'s No. 1 Mayfield, SW cor. Section 20-16-14, sand at 1,718-34 feet, shot with 60 quarts, 75 bbls.; J. J. Shock's No. 1 Johnson, NE cor. SE NE, Section 8-15-12, dry hole at 2,730 feet; W. E. Holmes and others' No. 1 Raiford, NE cor. SE SE, Section 7-14-11, dry and abandoned in the Wilcox sand at 3,048 feet; J. H. Rebold's No. 1 Haynes, SW cor. SE SW, Section 25-14-12, dry and abandoned at 2,771 feet; X-Ray Oil Co.'s No. 3 Rentie, C SW SE, Section 32-14-14, is dry and abandoned at 2,591 feet.

Petroleum company's No. 4-B Buck, SW cor. SE NE, Section 4-16-13, is drilling at 1,200 feet. Clover Brothers' No. 9 Grant, NE cor. NW NW, Section 3-15-11, is drilling at 485 feet; D. D. Mickelson's No. 2 Lewis, CEL SE SE, Section 4-15-11, drilling at 200 feet; A. W. Kirkland and Lyons' No. 1 Kelly, CNL SE NW, Section 17-15-13, rig; W. B. Pine, spudding No. 3 Rentie, SW cor. Section 3-15-14; also has rig on ground for No. 2 Corbray, NE cor. Section 9-15-14. Sidwell Drilling Co. is spudding No. 2 Lunsford, NW cor. SW SW, Section 4-14-11. Hazlett & Campbell are spudding No. 1 Dunbar, SW cor. Section 30-14-13. Elen Oil Co. is rigging up No. 9 Flint, CWL SE SE, Section 13-14-14; George Simon has rig on ground for No. 3 Bradford, NE cor. NW SW, Section 19-14-14; William Hewitt is spudding No. 9 Sutton, NW cor. SE NW, Section 33-14-14.

Lincoln County

Magnolia Petroleum Co.'s No. 3 Owens, NE cor. SW, Section 8-15-6, had sand at 4,029-34 feet and started at 350 bbls. naturally; T. B. Slick's No. 1 Norton, SW cor. NE, Section 7-14-4, had sand at 3,296-3,313 feet, 25 bbls.; Phillips Petroleum Co.'s No. 1 Williams, CEL SE NW, Section 33-13-4, dry and abandoned at 4,520 feet.

Muskogee County

E. L. Kistler's No. 3 Vanderslice, CWL NW SW, Section 29-15-15, Muskogee County, had sand at 1,578-81 feet, shot it with 2 quarts and the well made 114 bbls in 24 hours.

Jack Summers' No. 1 Durant, SE NE, Section 30-15-15, is a machine. Future Development Co. has rig on ground for No. 1 Jefferson, SW cor. NW, Section 33-15-15. J. O. Tilley is moving in machine for No. 1 Harrison, SE cor. SW, Section 15-15-16. Herbert Oil Co.'s No. Lother, SW cor. Section 17-13-19, is drilling at 200 feet.

Okfuskee County

Barnsdall Oil Corp.'s No. 5 Deaner, C NW SE, Section 3-12-11, shut in for 3,000,000 feet of gas at 2,610 feet; same company's No. 3 Randall, C NW NE, Section 10-12-11, dry and abandoned at 2,627 feet; Josey Oil Co.'s No. 16, C NW SW, Section 33-12-11, sand at 2,712-18 feet, shot with 40 quarts, 190 bbls.; Colorado Oil & Gas Co.'s No. 1 Asbury, dry and abandoned at 2,500 feet.

J. M. Kistler is spudding No. 1 Scott, SW cor. Section 8-12-11. Josey Oil Co. is building rig for No. 2 Stubblefield, C NE NW, Section 33-12-11.

Seminole County

Magnolia Petroleum Co.'s No. 2 Jackson, C SW SE, Section 14-8-7, had sand at 3,172-88 feet, made 80 bbls.; T. B. Slick's No. 3 Jackson, C NE NW SW, Section 14-8-7, dry and abandoned in the Wilcox sand at 3,501 feet.

Prairie Oil & Gas Co.'s No. 4 Kincaid, SW cor. SE SE, Section 33-10-6, is drilling at 2,500 feet, and No. 6, NE cor. SW SE, is a rig; Searight Oil Co.'s No. 1 Epperson, C SE SE NE, Section 33-10-6, is drilling at 1,600 feet. No. 2, SW cor. SE NE, is drilling at 600 feet and No. 3, SE cor. SW NE, is a rig. Prairie Oil & Gas Co. is spudding No. 3 Washburn, SE cor. SW NW, Section 34-10-6. Gypsy Oil Co. and Prairie Oil & Gas Co.'s No. 1 Micco, SW cor. NW, Section 12-10-7, rig; Carter Oil Co.'s No. 1 Knappenberger, SW cor. Section 13-9-6 setting 12½-inch casing at 120 feet; No. 2, SE cor. SW SW, drilling at 108 feet. Mid-Continent Petroleum Co. is building rig for No. 2 Renty, SE cor. SW SE, Section 14-9-6. Amerada Petroleum Co.'s No. 1 Fixico, SW cor. SE NE, Section 23-9-6, is drilling at 1,150 feet. No. 2, SE cor. NE, is spudding and the crew was rigging up No. 4, NW cor. SE NE. Same company's No. 1 Renty, SE cor. NW NE, Section 23-9-6, is a rig. Rig is on the ground for No. 2, NE cor. NW NE; also for No. 3, NW cor. NE, and No. 4, SW cor. NW NE. Carter Oil Co. is building rig for No. 4 Grisso, SE cor. NE NW, Section 23-9-6. On its Kilingsworth lease in same section, it is rigging up No. 2, NE cor. SE NW, building rig for No. 3, C NE NW, and No. 4, NE cor. NW. Independent Oil & Gas Co. is rigging up No. 1 Fixico, SW cor. Section 23-9-6. Indian Territory Illuminating Oil Co.'s No. 2 Goodin, SE cor. NE NE, Section 23-9-6, is a rig, likewise No. 3, SW cor. NE NE, and the rig is on the ground for No. 4, NW cor. NE NE. Barnsdall Oil Co. is spudding No. 6 Carter, NW cor. SW, Section 24-9-6. Carter Oil Co.'s No. 2 Carter, NW cor. NE, Section 24-9-6, is drilling at 90 feet. On its Joe Carter lease, in same section, No. 4, CWL SW SW, is setting 12-inch at 57 feet. Gypsy Oil Co. is spudding the following wells on its Joe Carter lease in Section 24-9-6; No. 3, NW cor.; No. 4, NE cor. NW; No. 5, NW cor. NE NW; No. 6, C SE NW NW; No. 7, SW cor. NW NW, and No. 8, NE cor. NW NW. Indian Territory Illuminating Oil Co. No. 8 Reed, C SE SW NE, Section 9-9-6, an old well drilling deeper, is drilling at 4,092 feet; Tidal-Osage is spudding No. 3 Carter, NW cor. SW, Section 24-9-6. Empire Gas & Fuel Co.'s No. 1 Noble, C NW NW SE, Section 9-9-6, is a rig. Gypsy Oil Co. is rigging up No. 1 Harjo, NW cor. SW, Section 25-9-6. Magnolia Petroleum Co. is rigging No. 3 Bloss, NW cor. Section 25-9-6, and No. 3, SW cor. NW, is a rig. Prairie Oil & Gas Co. has rig on ground for No. 4 Bloss, NW cor. SW NW, Section 25-9-6. No. 5, SW cor. NW NW, is a rig. The Gypsy Oil Co. is rigging up the following wells on its Fixico lease in Section 25-9-6; No. 6, C SE NE NE; No. 7, NE cor. NW NE; No. 8, NW cor. NE NE. They are spudding No. 3 Wolfe, NW cor. Section 26-9-6, and No. 4, NE cor. NW NE. Independent Oil & Gas Co. and Garland's No. 5 Fixico, SW cor. SE NE, Section 26-9-6, is drilling at 550 feet and they are spudding No. 6, NW cor. NE NE. Indian Territory Illuminating Oil Co.'s No. 5, NW cor. NE SE, Section 26-9-6, is a rig, and rigs are on the ground for No. 7, CWL NE SE; No. 8, NE cor. SE SE, and No. 11, NW cor. SE SE. Turman Oil Co.'s No. 1 Zeiger, C SW SW NW, Section 35-9-6, a rig.

Hughes County

Papoose Oil Co.'s No. 3 Tiger, C NW NE SE, Section 4-9-6, is plugged and abandoned at 4,172 feet. Magnolia Petroleum Co.'s No. 3 Scott, SW cor. Section 33-8-8, is plugged and abandoned at 4,207 feet. Humble Oil & Refining Co.'s No. 2 Garner, C NE SE NE, Section 5-7-8, is dry at 4,193 feet. Independent Oil & Gas Co. and Atlantic Producing Co.'s No. 4 Simon, NW cor. SW, in same section, is also dry and abandoned at 4,222 feet. Magnolia Petroleum Co.'s No. 1 Garner, C NE SE NE, Section 5-7-8, had sand at 4,025 feet, made 152 bbls. the first 24 hours. Same company's No. 2 Hawkins, C NE SW NE, Section 6-7-8, had sand at 4,207 feet, made 9 bbls. of oil and bbls. of water. Producers &

(Continued on Page 89)

BUTLER AND GREENWOOD COUNTIES FURNISH NEW KANSAS PRODUCTION

By J. L. Dwyer
Staff Correspondent, Kansas Fields

In the Kansas fields, Greenwood County continues to furnish the bulk of new production by completed oil wells. During the past week, Butler County was a very close second, due to the drilling of inside wells in the old Towanda and Eldorado fields.

In the newer territories, Sumner County is the most active and interesting spot. The wells completed 10 days ago by the Twin State Oil Co. have caused additional interest to be displayed in a region which has long been favorably regarded by the geologists.

Cowley County

Shawver and others' No. 2 Newton, CEL SE NW, Section 15-30-4, had sand at 2,775-92 feet, shot it with 30 quarts and have a 30-bbl. initial producer.

Shawver & Wilt are spudding No. 1 Shurtz, NE cor. Section 20-34-3; Roxana Petroleum Corp.'s No. 1 Jones, NW cor. Section 21-34-3, is a rig. Marland Oil Co.'s No. 1 Haindel, SW cor. SE, Section 31-34-3, is drilling at 250 feet. Brady Brothers' No. 1 Holman, NW cor. SW SW, Section 19-33-3, is drilling at 676 feet. Roxana Petroleum Corp.'s No. 1 Carr, NW cor. Section 28-30-3, is drilling at 675 feet. Carter Oil Co. is building rig for No. 11 Waite, SE cor. NW SE, Section 19-32-3. Independent Oil & Gas Co.'s No. 1 State Land, CWL SW SE, Section 15-32-4, is drilling at 510 feet. T. B. Slick's No. 1 Reynolds, NW cor. NE, Section 22-32-4, is drilling at 1,050 feet.

Sumner County

Roxana Petroleum Corp.'s No. 1 Owen, SE cor. NW, Section 17-32-2, had the second break in the line at 3,674-84 feet. Its four-day record on the swab was 349, 305, 321 and 300 bbls. and also 2 bbls. of water.

Magnolia Petroleum Co.'s No. 1 Reed, NW cor. SW SW, Section 4-32-2, is a rig. Roxana Petroleum Co.'s No. 1 Churchill, SE cor. NE SW, Section 2-31-2, is drilling at 525 feet and No. 1 NE cor. SE SW, drilling at 540 feet. Trees Oil Co. is spudding No. 4 Lewis, NW cor. NE NE, Section 28-31-4.

Butler County

C. E. Roth and others' No. 10 Hamm, NW cor. NE SW, Section 13-29-8, had sand at 2,997-99 feet and made 100 bbls. the first 24 hours; T. C. Johnson's No. 2 Blakeman, NW cor. NE SW, Section 3-28-6, sand at 3,047-54 feet, 437 bbls. Mid-Kansas Oil Co.'s No. 1 Blakeman, NW cor. SE SW, Section 3-28-6, had at 3,045-51 feet, 432 bbls.; Empire Gas & Fuel Co.'s No. 11 Starkey, SW cor. SE SE, Section 35-27-4, sand at 2,579-79 feet, 80 bbls.; Phillips Petroleum Co.'s No. 2 Blankenship, NW cor. NW NW, Section 16-27-6, dry and abandoned at 3,220 feet; Richmond Drilling Co.'s No. 1 Rose, NE cor. NW, Section 27-27-6, sand at 2,696-2,714 feet, shot with 40 quarts, 30 bbls.; The Texas Company's No. 1 Hill, SW cor. NE SE, Section 7-27-7, dry and abandoned at 3,160 feet; Empire Gas & Fuel Co.'s No. 1 Warrell, SW cor. SE, Section 22-27-7, had sand at 2,702-22 feet, shot with 40 quarts, made 85 bbls.; White Eagle and others' No. 2 Stewart, SW cor. SW SW, sand at 2,624-92 feet, shot with

(Continued on Page 328)

FOURTH WELL IN TURNER VALLEY GETS FLOW OF WET GAS IN MADISON

By Victor Lauriston

CHATHAM, Ont., Oct. 2.—In the Turner Valley Field southwest of Calgary, Illinois-Alberta Oil & Refining Co.'s No. 1 diamond drill test, LSD 14, Section 12-20-3w5, got a flow of wet gas at 3,746 feet depth. This is 97 feet in the Madison limestone, and is the fourth well in the Turner Valley Field to get wet gas production in the Madison. The outfit is working with a 4½-inch hole, and the gas flow is estimated at 5,000,000 feet a day, with approximately 1,650 pounds pressure. The gas carries a light amber oil, similar to the 67 gravity crude naphtha in McLeod No. 2. McLeod No. 2 got its production 132 feet in the deep lime, and Royalite No. 4 at 310 feet. Drilling has been resumed, in an effort to carry the test below the wet gas horizon at which, on account of the heavy gas pressure and loss of tools, Royalite No. 4 and McLeod No. 2 were compelled to finish. The Illinois-Alberta is the first diamond drill test in the Turner Valley Field, the hole having been carried to the top of the lime with a standard outfit and continued into the lime with the diamond drill.

Vulcan Oils, Ltd.'s, No. 1, LSD 11, Section 13-20-3w5, at 4,930 feet depth, is flowing about 3,000,000 feet a day of wet gas, with a fair condensation of light crude oil, about 49 degrees Baume. It is waiting for couplings and tanks, and when these arrive will be drilled in. As soon as the Vulcan is completed, the same drilling crew will spud in Spooner Oils, Ltd.,'s No. 1, LSD 4, Section 13-20-3w5, which is now rigged up.

Oil Seepage Reported

Great West Oil Co.'s No. 1, SE Section 7-30-2w5, has resumed drilling at 4,665 feet after running 8¼-inch casing to the bottom of the hole. Some oil seepage is reported. Dalhousie Oil Co.'s No. 1, LSD 4, Section 18-20-2w5, is at 3,582 feet and shut down waiting for casing. Dalhousie's No. 3, the old Alberta Southern No. 1, LSD 10, Section 13-20-3w5, has been abandoned at 3,345 feet. No. 6 has been located on the same subdivision and section 200 feet north of No. 3. Dalhousie's No. 5, LSD 8, Section 13-20-3w5, is at 2,265 feet and running 12½-inch casing. No. 6 will rig up as soon as weather conditions permit. A standard outfit will be used.

McLeod Oil Co.'s No. 2, LSD 16, Section 1-20-3w5, tried a light charge of dynamite to loosen the lost bit in the bottom of the hole but without success. Another effort is being made to drill past the lost tool. The well is reported making a little over 3,000,000 feet of wet gas a day.

Dutch-America Oils, LSD 14, Section 4-19-2w5, is fishing for lost tools at 4,327 feet. The tools have been jarred loose and the well is making considerable gas.

Big Chief Oil Co., Section 5-20-2w5, is below 2,500 feet and drilling steadily. Canada Southern No. 1, LSD 9, Section 1-20-3w5, is at 2,510 feet. The 8 inch casing has been cemented at 2,430 feet,

(Continued on Page 89)

Something has Happened In OIL WELL Chain

Something has happened in Oil Well Chain, you hear of it when engineers get together, you hear of it around city offices and out in the oil fields the boys are talking of it around the drilling rigs.

Yes, something has happened in Oil Well Chain, more things than ever happened at one time in all the history of rotary chains.

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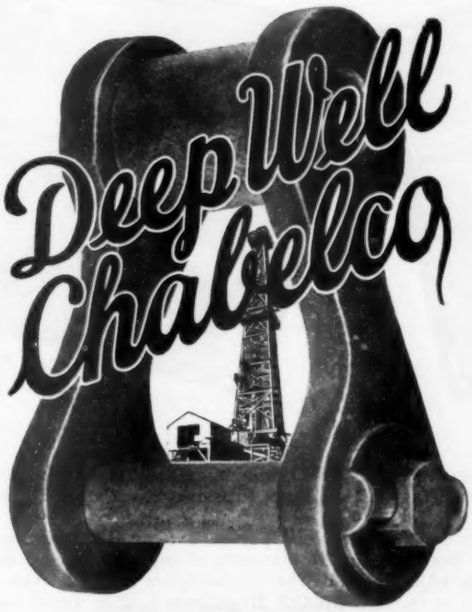

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Simmons Test to Prove Lawson Area

Intrusion of Salt Water Decreases Output of Georgetown Well. Deep Tests Fail to Give Encouragement

By James H. Dameron
Staff Correspondent, Louisiana-Arkansas

SHREVEPORT, La., Oct. 4.—Two areas in the Louisiana-Arkansas division are looked forward to hopefully by operators to check the decline of division production and send its trend upward. The two areas are, Lawson in Union County, Arkansas, and Georgetown in Grant Parish, Louisiana, with the latter holding out only meager promise of becoming a sizeable field, if one at all.

Phillips Petroleum Co. and associates' No. 2 Cordell, Section 6-18-13, in Lawson, which had the sand at 2,967-84 feet, has, in the opinion of every interested operator, opened up a field that will produce a good grade of crude. The oil from No. 2 Cordell tested 31.5 gravity. The well made 335 bbls. the first 24 hours on the swab and 296 bbls. the second 24 hours and then the swab was lost. Arrangements had been made to produce it with compressed air and an air jammer was en route to the lease.

Friday the well was put on air at 800 pounds pressure and started off making between 300 and 500 bbls. daily, according to various estimates. A connection was blown off before a near accurate estimate was made. Repairs were made Friday night and the air jammer started Saturday morning.

Lawson Area

Development of Lawson is being done cautiously, although antics of wildcats in that area a few weeks ago caused some stiff prices to be paid for acreage. The first offset to the Cordell well was made when Superior Oil Corp. staked a location for a diagonal northeast offset. Southeast of No. 2 Cordell, four test are boring for the deep sand and about 12 miles southeast, another is going down.

Simms Oil Co. and Sun Oil Co.'s No. 1 Simmons, Section 9-18-13, will prove or disprove the various prognostications made concerning Lawson. Six-inch casing is being cemented at 2,933 feet at the test. Sand was topped at that depth, considerably higher than at the Phillips Co.'s well, and penetrated 3 feet and showing oil. No. 1 Simmons blew out at 2,650 feet making 30,000,000 feet of gas and lots of salt water. The offset to the southwest missed the gas but got the salt water.

Misfortune caused a delay at No. 1 Simmons during the week. After steel line measurements had been taken the steel line was lost in the hole. That was followed by a fishing job for casing when it parted. The hole has been cleaned and the six-inch is being cemented on top of the sand.

Georgetown, in Grant Parish, made a bid for attention when Gulf Refining Co.'s No. 2 Swope, Section 17-9-1e, was tested in 3 feet of sand at 1,607-10 feet. The well started flowing at the rate of 75 bbls. daily, 15 per cent salt water, through a 1-inch choke. But the intrusion of salt water increased and the well's production was down below 50 bbls. the next day. Derricks are up for three other tests in that section while another test over east and in Section 15, had a showing of oil. One in the center and in Section 16, cored salt water sand at 1,553 feet.

Deep tests were given more discouragement when those tests drilling failed to bore into anything offering encouragement and when one was abandoned at 4,100 feet as a failure. It was Magnolia Petroleum Co.'s No. 1 Bond, Section 27-12-11, DeSoto Parish, in the old Naborton district. The hole was abandoned at 4,135 feet.

Urania Field

In the proven areas in the Urania Field in Louisiana reverted to old boom days when 10 wells were completed there, each averaging a little better than 200 bbls. per well. The biggest well was in the north end of the field where considerable new work has started. Only 42 bbls. of new production was brought in in other Louisiana fields. Nevada County, in Arkansas, came through for the third consecutive week with a new producer good for 100 bbls. or better. Lisbon fell below its usual pace in completions but what Smackover lost numerically it gained in initial production.

Throughout the division there were 35 completions. Twenty were recorded in Louisiana of which seven were dry holes and the remainder oil wells with a combined production of 2,072 bbls. Eleven new wells with a combined production of 908 bbls. totaled Arkansas' new producers with two dry holes closing the list. The gas wells were completed in the Monroe Gas Field. The total new production in the division was 3,080 bbls.

Monroe's two new wells had a combined production of 18,500,000 feet of gas. For a consideration reported to be $62,862 United Oil & Gas Products Co. sold 267 acres in the Monroe Field to the Consolidated Carbon Co. Mineral rights were included in the deal involving a small tract in Ouachita Parish. The bulk of the acreage was in Morehouse Parish.

Gains in daily average production in Louisiana could not offset the losses in Arkansas and the division average went off 105 bbls. Urania made a 1,000-bbl. gain for Louisiana with most other fields contributing. The only field in Arkansas showing a gain was the Stephens Field which showed a slight gain. Caddo light fell off 300 bbls. and removed that field from the class of fields producing 10,000 bbls. or more.

PRODUCTION BY FIELDS
Louisiana

	Bbls.
Bellevue	2,075
Caddo, light	9,895
Caddo, heavy	2,875
Cotton Valley	7,320
DeSoto and Red River	3,975
Elm Grove	560
Haynesville	9,385
Homer	5,625
Urania	16,465
Total	58,175
Arkansas	
Smackover, heavy	118,610
Smackover, light	14,225
El Dorado	6,840
Lisbon	7,815
Nevada	1,900
Stephens	1,900
Total	151,290
Total both states	209,465
Total last week	209,570
Loss	105

LOUISIANA
Big Week for Urania

Echoes of boom days for the Urania Field were heard during the week as that area piled up completions to bolster the tottering reports from other fields in the state. Ten new producers were completed each averaging 200 bbls., the smallest making 25 bbls. and the largest 800 bbls. The new wells were well scattered over the field.

Pima Petroleum Co.'s No. 9-B Urania, Section 7-10-2e, was the leader of the group when it came in making 800 bbls. from sand at 1,522-26 feet. However, the oil is cutting, showing 8 per cent water. Two others in the north end of the field were good completions. Hartanzo Oil Co.'s No. 1 Urania, Section 7-10-2e, was good for 150 bbls. naturally from sand at 1,509-14 feet. Most erratic of the completions in the north end was Catalina Oil Co.'s No. 1 Urania, Section 8-10-2e, which came in flowing 300 bbls. from sand at 1,525-29 feet. It flowed at that rate for 24 hours and is now making a big batch of salt water and only 50 bbls. of oil.

Completions in the south end of the field were not of an encouraging nature. Wetherbee and associates' No. 1-B Urania, Section 3-9-1e, is flowing 200 bbls. of fluid from sand at 1,494-97 feet, but cutting 75 per cent water. Keene & Woolf Oil Co.'s No. 3 Griswold, Section 3 9-1e, was dry and abandoned at 1,538 feet. Over on the east side and in Section 20-10-2e, Natural Gas & Fuel Corp.'s No. 6-M Urania was dry and abandoned at 1,600 feet.

Centering around the town of Tullos, half a dozen tests were completed. Finn & House's No. 2 Smith, Section 26-10-1e, is flowing 50 bbls. from sand at 1,546-50 feet. Henry Jones' No. 2 Taylor, Section 23-9-1e, was a hole full of water at 1,630 feet and was abandoned. Louisiana Oil Refining Corp.'s No. 35-B Tremont, Section 25-10-1e, is a 175-bbl. pumper from sand at 1,557-62 feet. Natural Gas & Fuel Corp.'s No. 5-A Russell, Section 26-10-1e, is pumping 25 bbls. from broken formation at 1,542-49 feet, and No. 6-A is pumping 55 bbls., 20 per cent water, from sand at 1,564-68 feet. Wooten and associates' No. 1 King, Section 36-10-1e, was good for a 75-bbl. pumper in sand at 1,525-33 feet. Across Castor Bayou and in Winn Parish, O. W. Clark's No. 9 Harper, Section 23-10-1e, is making 200 bbls. of clean oil from sand at 1,509-16 feet.

Increase in New Work

Good completions in the northern end brought an increase in new work to that area. Ten-inch pipe was set at 110 feet at Catalina Oil Co.'s No. 2 Urania, Section 8-10-2e. Chal Daniels' No. 1 Urania, Section 2-9-1e, is being bailed to test at 1,486-90 feet. Location was staked for Hartzanzo Oil Co.'s No. 2 Urania, 527 feet north and 150 feet SE cor. SE NW, Section 7-10-2e. Location was made for C. A. Hudson's No. 1 Urania, 630 feet south and 125 feet west NE SE SW, Section 7-10-2e. Hunt, McCurry & Zoder's No. 5 Urania, 150 feet south and east C Section 7-10-2e, is a derrick, as is No. 6 Urania, 737 feet south and 165 feet west of NE cor. SW SE, and No. 7 Urania, 437 feet south and 150 feet west of NE cor. SW SE.

Six-inch casing was cemented at 1,494 feet at Montague Oil Co.'s No. 4 Zenoria, Section 11-9-1e. McGaha and associates' No. 1 Urania, Section 5-10-2e, cored sand at 1,534-40 feet and is waiting for casing. Natural Gas & Fuel Corp.'s No. 5 Tullos, Section 26-10-1e, is a rig; No. 5-M Urania, Section 20-10-2e, waiting for standard rig at 1,588 feet; No. 7-M is being rigged and No. 8-M is a derrick. Oil Operators Trust's No. 6 Urania, Section 7-10-2e, is coring at 1,500 feet. Shreveport Oil Corp.'s No. 2 Pendarvis, Section 26-10-1e, is drilling at 1,200 feet. A derrick is up for C. W. Thompson's No. 1 Winberry, SW NE SW, Section 16-10-2e. Six-inch casing was cemented at 1,550 feet at Taylor, trustee's No. 5 Urania, Section 19-10-2e. Six-inch was cemented at 1,475 feet at Wetherbee and associates' No. 2-B Urania, Section 3-9-1e. Wooten and associates' No. 2 King, 510 feet north and 150 feet east SW NW NE, Section 36-10-1e, is a derrick.

On the Winn Parish side of the field, Allen and associates' No. 2 Allen, Section 23-10-1e, had sand at 1,507-13 feet and is waiting for a standard rig. Six-inch casing was cemented at 1,475 feet at O. W. Clark's No. 10 Harper, Section 26-10-1e. Six-inch casing was cemented at 1,512 feet at Natural Gas & Fuel Corp.'s No. 1-F Urania, Section 23-10-1e. Ten-inch casing was set at 101 feet at F. A. Shannon's No. 1 Albritton, Section 27-10-1e.

Bossier Parish

George W. Wetherbee's No. 14-A fee, Section 15-19-11, in the Bellevue shallow field, was drilled to 435 feet and is waiting for a standard rig.

Caddo Parish

Caddo Parish's trio of new wells could only boast of 42 bbls. of aggregate production. Lewis Oil Corp.'s No. 8 Vespy,

JORDAN HILL AND GEORGETOWN INTEREST LOUISIANA WILDCATTERS

By James H. Dameron

EL DORADO, Ark., Oct. 4.—Interest in wildcat plays in Louisiana and Arkansas was centered on the "Walber well." Phillips Petroleum Co. and associates' No. 2 Cordell, Section 6-18-13, in the Lawson area. The well was being put on air and will be produced in that manner. It made better than 300 bbls. of gravity oil on the swab the first 24 hours. Location for the first offset to the well has been staked. In Township 18-13 four other tests are drilling for the 2,900-foot sand, believed to be the Woodbine.

There was little excitement evinced in wildcats in other parts of the division. None had any showing to cause excitement and only one wildcat went into the completion list along the Caldwell-Angelina flexure, something unusual for that sector.

Some attention is being given the Jordan Hill district in Louisiana and lease trading there is reported to be fairly brisk due to a demand for wildcat acreage there. The Georgetown area in Grant Parish is being followed with interest by a number of operators as a result of the showing in H. L. Hunt's wildcat test.

Union County

Calgo Oil Co.'s No. 1 Primm, Section 9-18-17, is being delayed by a fishing job at 1,330 feet. A derrick is up for H. L. Hunt's No. 1 Dykes, NE cor. SE SW, Section 21-18-12. Imperial Oil & Gas Co.'s No. 1 Goodwin, Section 26-17-16, is waiting for 4½-inch casing to set at 3,082 feet. Marine Oil Co.'s No. 1 Thompson, Section 10-18-13, is drilling at 50 feet. H. O. Mellor's No. 1 Hill, Section 10-18-16, is a rig. Natural Gas & Fuel Corp.'s No. 1 Cordell, Section 9-18-13, tested salt water at 2,648-58 feet and is going on down. Peer Oil Corp. is finding it difficult to get fuel for No. 1 Hollis, Section 36-18-12, which is again shut down for fuel, total depth 1,200 feet. Six-inch casing is being set at 2,933 feet at Simms Oil Co. and Sun Oil Co.'s No. 1 Simmons, Section 6-18-13, total depth 2,933 feet, steel line measurement. A. H. Stoltz' No. 1 Wait, Section 4-18-16, is coring at 2,438 feet. Location has been staked

(Continued on Page 206)

Section 15-21-15, is pumping 12 bbls. from 1,690 feet. Ohio Oil Co.'s No. 20 E. K. Smith, Section 12-21-15, is a 22-bbl. pumper at 1,600 feet. The Texas Company's No. 3 Perry, Section 3-20-16, is pumping 8 bbls. of oil and 60 bbls. of salt water from 2,272 feet.

Deep tests in Caddo failed to uncover anything startling during the past seven days. Dixie Oil Co.'s No. 1 Jolly, Section 27-22-15, is drilling hard sandy lime at 4,378 feet. Gulf Refining Co.'s No. 1 Byrd, Section 2-19-14, is being delayed by a fishing job at 3,903 feet. Magnolia Petroleum Co.'s No. 16 Dillon, Section 24-21-15, is drilling hard sand and lime at 3,593 feet. No. 17 is shut down at 3,589 feet for orders, as is No. 1 Spell, Section 29-21-15, at which a fishing job at 3,552 feet was cleaned up and 1 foot of hole made before shutting down. Magnolia Petroleum Co.'s No. 1 Wiley Bradford, Section 24-21-15, is drilling lime at 3,918 feet. The Texas Company's No. 42 C. M. L. Co., Section 23-21-15, is drilling sandy shale at 3,781 feet.

Six-inch casing is being fished for at 1,018 feet at Bayou State Oil Co.'s No. 23 Peak, Section 23-22-15, and No. 24 is a derrick. W. H. Cook's No. 1 Muslow, 1,170 feet west and 410 feet north center Section 32-21-15, is a rig. Dixie Oil Co.'s No. 18 Muslow, Section 18-20-15, is drilling chalk rock at 1,575 feet. Dixie Oil Co.'s No. 80 Robertshaw, 470 feet north and 2,042 feet east, SW cor. Section 12-21-15, is a derrick. Dixie Oil Co.'s No. 10 Slattery, Section 27-21-15, is drilling hard lime at 2,550 feet. Golden Flood Oil Co.'s No. 2 Atkins, Section 31-21-15, is a rig.

On the Gulf company's Ferry Lake lease, No. 252 is drilling gumbo at 1,741 feet; No. 253 has 1,000 feet of oil in the hole from sand at 2,286 feet and is waiting for a standard rig; six-inch was cemented at 2,150 feet at No. 254; at 2,150 feet at No. 255 and at 2,125 feet at No. 256; No. 257 is drilling lime at 2,241 feet and a derrick is being built for No. 258 Ferry Lake, 2,020 feet west and 1,020 feet south NE cor. Section 28-20-16. Murphy and associates' No. 1 Youree, Section 13-20-15, is drilling at 1,910 feet. Morris Drilling Co.'s No. 2 Pala fee, Section 1-20-16, is drilling at 500 feet. Six-inch was cemented at 1,475 feet at Ohio Oil Co.'s No. 22 Smith, Section 7-21-14. Owl Oil Co.'s No. 1 Wilburn, Section 4-17-16, is being rigged. Radio Oil Corp.'s No. 3 Louisiana Oil fee, Section 31-21-15, is waiting for a standard rig at 1,506 feet. Six-inch was cemented at 2,145 feet at Superior Oil Co.'s No. 5 Youree, Section 26-20-15.

The Texas Company's No. 40 C. M. L. Co., Section 23-21-15, is being cored at 2,139 feet; No. 1 Curtis, Section 14-20-15, is drilling at 2,050 feet; No. 12 Russell, Section 3-20-16, is drilling at 2,264 feet. Tholl Oil Co.'s No. 1 Allday, Section 31-21-15, is being rigged. Thomason and associates' No. 1 Muslow, Section 31-21-15, is drilling at 550 feet. Six-inch was cemented at 1,060 feet at Unity Petroleum Co.'s No. 4 Crystal, Section 24-21-16; No. 5 is waiting for a standard rig at 1,048 feet; No. 6 Crystal, 1,320 feet west and 330 feet north SE cor. Section 14-21-16, is a rig as is No. 7 Crystal, 1,320 feet west and 990 feet south NE cor. Section 14-21-16. Six-inch was cemented at 1,376 feet at Van Cleve Syndicate's No. 1 Edson, Section 32-21-15. Victor Wenzell's No. 2 Hunsicker, Section 15-20-15, is drilling at 2,050 feet; No. 3 is a derrick; No. 1 Wemple, Section 14-20-15, was a hole full of water at 2,265 feet and was temporarily abandoned and No. 2 Wemple is being rigged.

Monroe District

Two gas wells with a combined production of 18,500,000 feet of gas were added to the list of Monroe producers last week. Maurey Drilling Co.'s No. 4 McErwin, Section 20-19-4e, made 12,000,000 feet from 2,190 feet and Hatcher & Evans' No. 3 fee, Section 17-19-4e, was good for 6,500,000 feet at 2,198 feet. George L. Pace and associates moved the rig from No. 1 Grang Pace fee, Section 30-17-1e, and abandoned the derrick. Standard Oil Co.'s No. 1 Cooperage, Section 34-21-8e, was junked at 1,137 feet.

Six-inch was cemented at 2,119 feet at Natural Gas Products Co.'s No. 8 Tensas Delta, Section 33-22-4e. The drill stem is being sidetracked at 2,224 feet at United Carbon Co.'s No. 1 Clarke, Section 26-20-5e. Six-inch was cemented at 2,127 feet at Central company's No. 2 Kerr, Section 12-19-4e. Gulf company's No. 1 West Virginia, Section 17-17-5e, is drilling at 1,028 feet. Hatcher & Evans' No. 5 fee, 1,571 feet east and 1,980 feet north, SW cor. Section 17-19-4e, is a rig. Maurey Drilling Co.'s No. 2 Frierson, 3,300 feet south and 660 feet east NW cor. Section 20-19-4e, is a rig. Ouachita Natural Gas & Oil Co.'s No. 2 D'Arbone, Section 25-19-2e, is being cored at 2,300 feet; No. 7 Allison, Section 87-21-4e, is drilling at 2,020 feet. Eight-inch was cemented at 835 feet at Palmer Corp.'s No. 4 Cole, Section 7-19-4e. Palmer Corp.'s No. 1 Lynch, Section 18-19-5e, tested 1,000,000 feet of gas at 2,181 feet and is waiting for orders. United Carbon Co. lost the hole at 810 feet at No. 1 Patton, Section 10-20-4e, and moved 100 feet north for the second hole. Gulf Refining Co.'s No. 1 Nelson, Section 5-19-1e, is drilling shale at 1,922 feet.

Webster Parish

Humble company's No. 2 Cox, Section 22-21-10, is waiting for casing to set at 4,260 feet. Magnolia Petroleum Co.'s No. 1 R. M. Lewis, Section 25-23-10, is drilling at 2,255 feet; six-inch was cemented at 2,538 feet at No. 3-A Turner, Section 21-21-10; location was staked for No. 4-B Turner, 990 feet north and east SW cor. NW, Section 21-21-10. R. W. Norton's No. 1 Josey & Massey, Section 27-21-10, is waiting for 5-inch to set at 4,246 feet. Eight and one-fourth inch casing is being set at 2,700 feet at Ohio Oil Co.'s No. 4 Bank of Cotton Valley, Section 22-21-10. Smitherman & McDonald's No. 1 Oakley, Section 29-23-11, is drilling shale and slate at 4,815 feet. While sidetracking, the bit and collar was lost in the hole at 3,700 feet at Southern Crude Oil Purchasing Co. and Ramsey's No. 1 Munn, Section 1-22-10, total depth of the hole is 4,620 feet.

ARKANSAS
Union County

Union County's eight completions were evenly divided between Smackover and Lisbon. In Smackover Gladys Belle Oil Co.'s No. 5-A Cook, Section 16-16-15, is a 90 bbl. pumper, 10 per cent salt water, from sand at 2,618-30 feet. Hollyfield and associates' No. 13 Giller, Section 10-16-15, was abandoned at 2,008 feet with the casing in the hole. Magnolia Petroleum Co.'s No. 3 Childs, Section 8-16-16, is a 30-bbl. pumper at 2,586 to 2,604 feet. The Texas Company's No. 8 Hays, Section 4-16-15, was one of the best wells completed in Arkansas last week, making 154 bbls. on the pump from sand at 2,355-65 feet. In Lisbon Humble company's No. 2 Goodwin, Section 20-17-16, was a 12-bbl. pumper at 2,144-64 feet. Magnolia company's No. 5 Halsey, Section 20-17-16, is a 20-bbl. pumper at 2,145-72 feet. Rovenger Oil Corp.'s No. 5 Graham, Section 16-17-16, is making 25 bbls. on the pump from sand at 2,092 to 2,114 feet. Southern Crude Oil Purchasing Co.'s No. 5-B Slaughter, Section 3-17-16, is pumping 20 bbls. from sand at 2,070 to 2,130 feet.

Little change was made in field operations in Lisbon during the past week. Gulf Refining Co.'s No. 1-A Slaughter, Section 20-17-16, is waiting for 6-inch to set at 2,137 feet. Six-inch was cemented at 2,085 feet at Humble company's No. 2 Snydor, Section 21-17-16; No. 3 Goodwin, NW cor. SE NE, Section 20-17-16, is a rig. Imperial Oil & Gas Co.'s No. 2 Parker, Section 21-17-16, has 300 feet of oil in the hole from sand at 2,113-59 feet and is waiting for a standard rig; No. 3 has a similar amount of oil from sand at 2,143-91 feet and is waiting for a standard rig. Imperial company's No. 1 Stocks, C NE NE SW, Section 21-17-16, is a rig, and No. 2 Stocks, C SE NE SW, is a derrick. A shot at 2,125 feet failed to help Lion Oil & Refining Co.'s No. 17-A Mitchell, Section 17-17-16, and the test tested salt water. The hole is being plugged back to 2,116 feet. Magnolia company's No. 6 Halsey, Section 20-17-16, is drilling at 1,630 feet.

Magnolia company's No. 3 A. E. Slaughter, Section 17-17-16, is drilling at 1,780 feet. Six-inch casing was cemented at 2,099 feet at Ohio Oil Co.'s No. 3 Stocks, Section 21-17-16. Six-inch was cemented at 2,112 feet at Reynolds & Marr's No. 4 Goodwin, Section 21-17-16. Rovenger Oil Corp.'s No. 3 Dumas, Section 9-17-16, has 300 feet of oil in the hole from 20 feet of sand topped at 2,086 feet and is waiting for a standard rig. No. 9 Dumas, NW cor. SW SW, is a rig. Southern company's No. 6-B Slaughter, Section 3-17-16, is drilling at 1,021 feet. On the Unity Petroleum Co.'s Snydor lease, Section 21-17-16, four wells each have 250 feet of oil in the hole and are waiting for standard rigs. No. 1 had sand at 2,101-41 feet; No. 2 at 2,118-60 feet, No. 3 at 2,118-50 feet and No. 4 at 2,100 to 2,134 feet.

Smackover and El Dorado

In Smackover and El Dorado operations remained unchanged. Belmont and associates' No. 1 Hollis, Section 13-18-15, is drilling at 635 feet. G. J. Childs' No. 4 fee, Section 8-16-16, is drilling at 1,365 feet. Sam Cook's No. 9 Tatum, CEL NW NE, Section 7-16-15, is drilling at 400 feet. Constant Refining Co.'s No. 4 Robinson, NW cor. S half SW NE, Section 6-18-15, is a rig. Gladys Belle Oil Co.'s No. 9 Cook, Section 16-16-15, is drilling at 2,160 feet. Grimes & Jones' No. 10 Van Hook, Section 8-18-14, is drilling at 1,365 feet. Six-inch casing was cemented at 2,364 feet at Gulf Co.'s No. 42 Hardy-Murphy, Section 3-16-15, No. 43 is drilling at 1,720 feet. Gulf company's No. 48 L. Werner, Section 6-16-16, is being bailed to test broken sand at 2,240-57 feet. Arrangements are being made to shoot the casing at 2,804 feet at F. C. Henderson's No. 3 Smith, Section 18-16-15. Hollayfield & McFarland's No. 14 Giller, Section 10-16-15, is drilling at 260 feet. Humble Oil & Refining Co.'s No. 13 Umsted, Section 5-16-15, is not to be deepened and was dropped from the report.

Keene & Woo'f Oil Co.'s No. 3 Murphy, Section 9-16-15, is drilling at 2,550 feet. Arrangements are being made to deepen Louisiana Oil Refining Corp.'s No. 1-B Murphy, Section 9-16-15, which was completed in June, 1924, at 2,475 feet making 1,500 bbls. Lion Oil & Refining Co.'s No. 6 Bilyew, Section 9-16-15, is a rig. Magnolia company's No. 4 Childs, Section 8-16-16, is drilling at 200 feet. Magnolia company's No. 4 Hessler, Section 8-16-16, is drilling at 1,435 feet; 6-inch casing was cemented at 2,702 feet at No. 1 Murphy, Section 28-16-16. Murdock and associates' No. 4 Hays, Section 4-16-15, is drilling at 530 feet. Murdock and associates' No. 1 Vestal, Section 17-16-15, is being reamed down to 2,530 feet. Natural Gas & Fuel Corp.'s No. 7-B Lawton, Section 10-16-15, is drilling at 1,101 feet. Eight and one-fourth inch casing was cemented at 2,282 feet at Pure Oil Co.'s No. 1 Bilyew, Section 8-16-15. S. L. Ramage's No. 1 Ezell, Section 24-16-15, is drilling at 320 feet. The drill stem which stuck at 2,000 feet at A. H. Ramage's No. 6-C Lawton, Section 10-16-15, was fished out and the hole cleaned and has been temporarily abandoned at 2,409 feet.

Simms Oil Co.'s No. 12 Cook, Section 16-16-15, is drilling at 2,483 feet; No. 1 H. O. Murphy, Section 33-16-16, is drilling at 1,442 feet. Southern company's No. 10 Graves, Section 3-16-15, tested salt water at 2,670 feet, total depth 2,730 feet. Southern company's No. 5-A Wells, Section 15-16-15, is being plugged back from 2,594 feet to cut off salt water. Standard Oil Co.'s No. 4 Reynolds, Section 6-18-15, is being bailed at 2,182 feet and is 6 feet off bottom. Standard Oil Co.'s No. 37 Hardy, Section 9-16-15, is drilling gumbo at 2,270 feet. Location has been staked for Superior Oil Co.'s No. 1 Cordell, 8W cor. NW NW, Section 5-18-13. The Texas Company's No. 8 Calloway, Section 4-16-15, is being bailed to test sand at 2,352-64 feet. The Texas Company's No. 4 C. L. Saxon, Section 4-16-16, is being deepened but operations are being delayed by a fishing job at 2,252 feet.

(Continued on Page 325)

INTEREST IN OIL POSSIBILITIES WEST OF PECOS RIVER REVIVED

By Special Correspondent

ARTESIA, N. Mex., Oct. 2.—Over 300 feet of oil standing in the hole of No. 1 Winans, drilled by Rehn and others in Section 15-18-26, has again revived interest in the oil possibilities west of the Pecos River. The Winans test, which is to the north of the old Brown well that showed oil over 20 years ago, is believed to be located on a fair-sized structure and, when completed, will probably make a small producer. With the artesian water cased off the well was shot from 1,625 to 1,640 feet and is now being cleaned out.

The Empire Oil & Gas Co. is drilling No. 2 in the NW of Section 2-18-27, this offsetting No. 1 producer to the south. The latter well continues to make an average of 32 bbls. daily from 1,625 to 1,640 feet. Flynn, Welch & Yates have started rigging on their No. 52 in Section 28-18-28, and have No. 53 in Section 32-18-28, down 1,400 feet. On the north end of the field No. 1 of Phillips & Welch in Section 35-17-28, has been put on production, the well making around 10 bbls.

The Pueblo Oil Co. expects to reach the lower pay in its well in Section 33-17-28 within the next 100 feet. Several hundred feet of fluid is standing in the hole from the first pay encountered and from present indications the well will make a good producer, extending the present productive area several miles.

The Marland Oil Co. is the latest to enter southeastern New Mexico and will drill several wells in this state and western Texas. Just where these tests will be located has not been announced. This company has been engaged in reconnoissance work in this state for two years. More work has been done by the Marland company, in a geological way, than by any of the other majors.

Maljamar Pool

In the Maljamar Pool No. 1 Baish is pumping steadily at the rate of 200 bbls. daily, with no water showing. Offsetting the producer to the north No. 1 of this company in the SE of Section 16-17-32 is down 400 feet in No. 1 on the Mitchell permit in Section 5-17-32 is drilling at 650 feet, after cleaning up a bad fishing job.

There is little doubt the Ohio Oil Co. will make a well of its initial test on the William Mitchell permit in Section 18-17-32, as the log shows this well to be running considerably higher structurally than the Baish producer. The bottom of the salt in the Ohio was 1,848 feet, steel line measure.

To the south of this test, the Bruce Sullivan No. 1 on the Lodewick permit, Section 1-18-31, is shut down waiting on a string of 8¼-inch casing, which will be set at 2,465 feet.

Henderson, Dexter & Blair are running 675 feet of 12½ inch pipe in their No. 1, located on the SW of Section 34-17-33. On the escarpment the Cap-Rock Oil & Gas Corp. is drilling with a rotary, the hole being down 350 feet.

Between the Artesia and Maljamar Poo's the Wooley, Jones No. 1 on the Beeson permit is drilling below 3,200

(Continued on Page 89)

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Report Dome Near Napoleonville, La.

Boling Well Has Initial Flow of 1,000 Bbls. Spindletop Contributes 5,000 Bbls. New Production

By P. L. McGreal
Staff Correspondent, Gulf Coast Fields

HOUSTON, Tex., Oct. 4.—It has been a quiet week in the Gulf Coast pools compared with the past weeks since last July. Eighteen wells were completed, three being dry and two salt water. The new production is only 9,665 bbls. and Spindletop contributed 5,000 bbls. of the total.

The features of the week were reports that the Gulf Refining Co. had found dome formations in a test near Napoleonville, La., a well with initial flow of 1,000 bbls. at Boling and increasing interest in wildcat tests in south Louisiana.

The estimated daily average gross production for the week of October 2 is placed at 184,580 bbls., a decrease of 3,810 bbls. from the estimate for the previous week.

Compared with the week of September 25, Boling increased 610 bbls.; Hull, 250 bbls.; Pierce Junction, 250 bbls.; Sour Lake, 1,150 bbls. The pools showing decreases are as follows: Blue Ridge, 50 bbls.; Big Creek, 475 bbls.; Goose Creek, 350 bbls.; Lockport, 1,100 bbls.; Orange 975 bbls.; West Columbia, 600 bbls.; Spindletop, 2,500 bbls.

The estimate for each pool is as follows:

Pool—	Daily Av.
Boling	2,450
Batson	1,770
Blue Ridge	1,550
Big Creek	1,700
Barber Hill	1,200
Dayton	170
Damon Mound	785
Edgerly (La.)	725
Goose Creek	9,750
Hu	4,500
High Island	22,350
Jennings (La.)	115
Lockport (La.)	1,375
Markham	4,500
Nash	75
Orange	800
Orchard	7,725
Pierce Junction	100
Piedras Pintas	3,500
Spindletop	150
Saratoga	89,500
Sour Lake	1,400
South Liberty	10,200
Vinton (La.)	3,900
West Columbia	5,900
Welsh-Anse La Bute (La.)	8,200
Miscellaneous	70
	120
Total	184,580

Southwest Fields

The estimated daily average gross for the Southwest fields for the same period is 45,465 bbls., a decrease of 160 bbls. compared with last week. Luling declined 720 bbls. and Mirando increased 500 bbls.

The estimate for each field is as follows:

Field—	Daily Av.
Luling	21,400
*Mirando	17,500
Somerset	2,050
Calliham	80
Rockdale-Minerva	935
Lockhart	3,500
Total	45,465
Grand total for week	230,045
Grand total for last week	234,015
Net decrease	3,970

*Includes Webb, Jim Hogg, Zapata Counties and the Cole-Bruni section of Duval County.

Week's Operations

The following table shows the results of the week's operations in the various Coastal pools:

Pool—	Com.	Prod.	Dry	Sw.	Bailing
Boling	1	1,000	0	0	0
Batson	0	0	0	0	2
Edgerly	2	25	0	0	0
Goose Creek	1	100	0	0	0
Hull	5	180	1	1	0
Nash	0	0	0	0	1
Orange	2	160	0	0	0
Spindletop	2	5,000	0	0	2
Saratoga	1	0	1	0	0
Sour Lake	2	2,000	0	0	0
Vinton	1	1,200	0	1	0
Miscellaneous	1	0	1	0	0
Total	18	9,665	3	2	5

In the light gravity section of the Sour Lake Pool, J. F. Bashara's No. 2-C fee came in flowing 1,500 bbls. and Eunice-Carpenter's No. 2 fee, is flowing 500 bbls. at 3,890 feet. Strainer was set in 90 feet of sand. The southwest light gravity side is credited with 6,500 bbls. of the 10,200 bbls. total credited to the entire district.

The Yount Lee Oil Co. opened the deep sand light gravity section at Sour Lake one year ago this month. The same company developed the deep sands at Spindletop one year ago in September. Both districts are alike in one respect. The acreage is cut up into small tracts, necessitating close drilling and many offsets. The deep sands at Sour Lake are found about 4,000 feet southwest from the old cap rock section and are picked up from 3,700 to 4,200 feet. There are 19 deep sand producers at present. The Humphreys Corp. has 6, the Yount Lee Oil Co. 5, Eunice-Carpenter 3, J. F. Bashara 3, Orange Petroleum Co. 1 and Gulf Production Co. 1.

At present the Gulf Production Co. is drilling Nos. 1, 2 and 3 Cora Jackson and rigging No. 4. Humphreys Corp.'s Nos. 3 and 4 Bashara are drilling and Nos. 5 and 6 are drilling. No. 1 Oxford is around 2,200 feet. No. 1 Geiske is a derrick. The Orange Petroleum Co. is starting No. 2 Merchant. The Gilbert Oil Co. has a location for No. 99 fee. The Texas Company's No. 104 fee is drilling and No. 30 working over.

The Rio Bravo Oil Co. abandoned No. 11 Jorditt in the Saratoga Pool in salt water at 1,325 feet.

Two wells are bailing in the Batson Pool, S. R. Buchanan's No. 91 Milhome at 1,140 feet and the Paraffine Oil Co.'s No. 67 Paraffine at 1,190 feet.

The Gulf Production Co.'s No. 1 Cruse, a deep test on the southwest side, is drilling around 3,100 feet. The same company's No. 64 Choate is at 1,135 feet. The East Batson Oil Co.'s No. 9 Counselman is around 1,345 feet. The Ada Belle Oil Co.'s No. 110 Texas is at 1,086 feet. Locations have been made for the Acorn Oil Co.'s No. 61 Paraffine and the Sterling Oil Co.'s No. 3 Choate.

Orange Pool Dwindles

Operations in the once active Orange Pool have dwindled to almost nothing. A survey of the situation indicates the limits of the pool have been defined and the deep sand wells are disappointing. In the early days of the pool salt water got into the sands through carelessness in drilling. The activity at Spindletop, Sour Lake and Pierce Junction has attracted operators from the Orange Pool and it is doubtful if it will ever again become an active spot. Tests for deep production have been made pretty generally in all sections of the district. The Orange Pool is one of the few producing spots in the Gulf Coast region where salt has never been found and many operators express themselves as doubtful if it is a saline uplift.

The Sun Oil Co.'s No. 2 Brown in the southeast section of the pool is pumping 60 bbls. at 4,500 feet, after being redrilled. The Supreme Oil Co.'s No. 1 Jackson is pumping 100 bbls. at 4,015 feet.

Holes are being deepened as follows: Brownie Babbittee Oil Co.'s No. 7 McLean, Rex Petroleum Co.'s No. 2 Carbello, Humble Oil & Refining Co.'s No. 10 Winifree and Gulf Production Co.'s No. 1 McGuire. The Humble company's No. 2 Winifree is at 3,675 feet. The Orange Petroleum Co.'s No. 7 Chesson is drilling at 4,080 feet. The Texhoma Oil Co.'s No. 9 Chesson is at 4,254 feet and the Ryeade Petroleum Corp.'s No. 1-C State Land in Cow Bayou is around 3,785 feet.

Liberty County Pools

In the Hull Pool, the Republic Production Co.-Houston Oil Co.'s joint No. 138 Dolbear is pumping 100 bbls. at 2,320 feet. The Humble Oil & Refining Co.'s No. 22 Guedry is pumping 80 bbls. at 3,000 feet. Its No. 1 Lynd bailed salt water at 4,375 feet and is being drilled deeper. The Houston Production Co. abandoned No. 10 Taylor at 2,975 feet. The Hull Oil Co. is deepening No. 11 Abel from 2,050 feet where it showed dry gas. The Empire Gas & Fuel Co.'s No. 21 Bürngrover, which came in last week making 1,000 bbls. at 3,075 feet, has sanded.

On the Dolbear 800 acres on the east side of the hill, the Republic Production Co.-Houston Oil Co.'s No. 39 is working over. No. 126 is at 2,335 feet. No. 136 is at 2,275 feet. The Humble Oil & Refining Co.'s No. 4 Hooks-Spell is drilling deeper. Locations have been made for Nos. 2 Lynd and 5 Merchant. The Gulf Production Co.'s No. 5 Phoenix is working over at 3,125 feet. No. 62 is deepening at 3,110 feet. No. 73 is at 3,090 feet and No. 74 is at 3,400 feet. Nos. 75 and 76 are locations. The Texas Company's No. 1 Armelin is drilling around 2,975 feet. The Texas Company-Vacuum's joint No. 6 Hannah is sidetracking at 1,300 feet. The Gulf company's No. 12 David Hannah is at 3,765 feet and No. 19 is below 1,750 feet.

In the South Liberty Pool, the Humble Oil & Refining Co.'s No. 3 Welder in the west extension west of the Trinity River, is drilling below 3,550 feet and No. 4 is around 2,975 feet. The Gulf Production Co.'s No. 1 Beckman is at 2,600 feet. The Premium Oil Co.'s No. 1 Mitchell is at 4,300 feet. The Peer Oil Co.'s No. 1 Harrison is sidetracking. The Sinclair Oil & Gas Co.'s No. 1 Condict will be drilled deeper. It is an old well.

(Continued on Page 90)

SPINDLETOP WELLS HOLDING UP WELL, AVERAGE FOR WEEK 89,500 BBLS.

By P. L. McGreal

BEAUMONT, Tex., Oct. 4—The daily average for the week ending Saturday, October 2, in the deep sand section of the Spindletop Pool is 89,500 bbls., a decline of 2,500 bbls. compared with the previous week. The bulk of the work is still confined to the west side of the original cap rock area, with interest divided between wells drilling for the latest sand below 4,200 feet, found by the Gulf Production Co. two weeks ago on the Weed and the Magnolia Petroleum Co.'s test to the south of production on its tank farm.

Illustrating the variable production gaits there, the gauge at 7 a. m. Tuesday showed 95,000 bbls., divided as follows:

Company—	Daily Av.
Yount Lee Oil	46,000
Gulf Production	24,000
Rio Bravo Oil	9,500
Atlantic Oil Production	8,800
Miscellaneous	4,700
Total	95,000

*Includes Sun Oil Co., Unity Oil, Paggi & Co. and W. C. Turnbow.

The Rio Bravo Oil Co. completed No. 52 T. & N. O. right of way, located between its Nos. 1 and 3, at 3,250 feet, with initial flow of 3,500 bbls. The Atlantic Oil Producing Co. deepened No. 1 McLean to 3,229 feet and got a well flowing 1,500 bbls. initial output late in the week. Same company is bailing No. 9 McLean at 3,450 feet. The Unity Oil Co. is bailing No. 90 McFaddin at 2,000 feet.

The Yount Lee Oil Co. has 13 of its 55,000-bbl. tanks completed on its tank farm east of the pool and is building 14 more. The company proposes to erect 40 tanks of 55,000 bbls. capacity each on the tank farm and store its production. The tanks are being erected by the Petroleum Iron Works, of Sharon, Pa., and the material was transported from the shops on special trains.

The wells on the west side deep sand section are holding up better than was anticipated and but few of them are on the pump, which is a remarkable record when it is considered how close they are spaced and all flowing from the same sands at different depths.

The status of drilling wells is as follows: Atlantic Oil Producing Co.'s No. 10 McLean drilling at 3,365 feet and No. 11 at 1,500 feet. No. 12 is around 2,655 feet, with No. 13 below 3,545 feet. Locations made for Nos. 14 and 15. The Gulf Production Co.'s No. 6 Weed is a location. No. 7 is drilling at 2,876 feet. No. 8-A is a location, as is No. 9. No. 6 Oakwood is around 2,655 feet. No. 4 Jack-Duff is drilling for the deep sands and is now below 3,975 feet. No. 5 is at 2,000 feet and No. 6, another deep sand test, is below 3,980 feet. No. 4 Roche is shut down at 2,850 feet. No. 5 is drilling around 2,875 feet, with locations for Nos. 6, 7 and 8.

The Rio Bravo Oil Co.'s No. 7 T. & N. O. is fishing at 2,600 feet. Nos. 8 and 9 are locations. No. 51 is drilling around 3,000 feet. It is between Nos. 2 and 4. The Sun Oil Co. is deepening No. 1 McLean. No. 3 McLean is around 3,655 feet. No. 4 is at 3,235 feet. No. 5 is a location. No. 6 is drilling at 2,435 feet. No. 7 is around 3,535 feet and No. 1 Price is at 3,565 feet.

The Deep Sand Oil Co. will deepen No. 1 Howell from 2,490 feet. No. 2 will pump at 3,240 feet and No. 3 Howell is drilling below 2,980 feet. W. B. Flynn's No. 1 Gladys is sidetracking at 1,985 feet. Seiss and others' No. 1 Pierce is at 1,100 feet. Ross Combat's No. 1 Ewing is idle at 3,350 feet. Hines' No. 1 Ewing is below 4,120 feet. The Grayburg Oil Co.'s No. 1 McLean is at 3,736 feet. Paggi & Co.'s No. 2 Gordon will pump at 3,325 feet. No. 1 will be deepened and No. 3 Gordon is going after the new deep sand, drilling below 4,100 feet. The Favorite Oil Co.'s No. 1 Weed is shut down at 4,280 feet. The Walker Oil Co.'s No. 1 Quinn is at 4,119 feet. No. 2 Quinn is a location. The Plummer Oil Co. has a location for No. 1 Quinn. The Kinnear Oil Co. has the same for No. 1 Gladys. The New Beaumont Oil Co.'s No. 1 Garrick, north of production, is drilling around 2,800 feet.

The drilling report shows three wells below 4,100 feet, one of these being shut down at 4,280 feet, or 36 feet lower than the depth at which the Gulf company got the sand in No. 4 Weed last month.

The Atlantic Oil Producing Co.'s No. 9 McLean, reported bailing, came in flowing 1,000 bbls. at 3,450 feet.

Kleberg County Test Interesting

Southwest Texas Development Southeast of Kingsville by Humble Company May Bring Activity There

By B. D. Stevenson
Staff Correspondent, Southwest Texas Fields

SAN ANTONIO, Tex., Oct. 4.—Outside of the completions in the various fields none of which were of more than ordinary importance the most important and interesting development is the test about to be made in the Humble Oil & Refining Co.'s No. 1-B Dennett in Kleberg County, several miles southeast of Kingsville, where Humble more than a year ago completed a well at around 2,000 feet and followed it with others but with more or less trouble with water. It went north a mile for No. 2 Kleberg trustee and got a well free from water at 2,052 feet and now is drilling the No. 1-B Dennett 360 feet north of that at close to 2,000 feet and intending to set 10-inch casing for the test when the sand is reached.

Considerable importance attaches to it as it is thought it is higher on the structure and should get bigger production and if it does may add considerably to the importance of the field. No. 1-C Dennett, located 360 feet west of No. 1-B is drilling at around 500 feet with 10-inch casing set at 372 feet. The Texas Company and Gulf company are about the only major interests that have taken acreage near the pool but there is coming to be some activity and more of course would follow with the completion of a better well. Kleberg County Oil & Gas Co. a few years ago got a gas well there and Kingsville has had natural gas ever since. It owns 1,400 acres in a block and it is understood there have been some approaches made looking to a purchase of this block by outsiders. The company has been supplying Kingsville with natural gas and has a pipeline and distributing system.

Milam County

In the Rockdale Field in Milam County several wells have recently been completed in the shallow sand. Gorman Oil Co.'s No. 3 had so much gas that it made several heads while tubing was being run. It and the Palmer-Newton Co.'s No. 1 Dees will make about 30-bbl. pumpers. Chicago Oil & Land Co.'s No. 1 White will make about 25 bbls. Union Production Co.'s No. 11 Strelsky 15 bbls. and No. 10 will pump 12 bbls. Two wells completed by the Wahpoo Oil Co. on the Gross lease will make about 10 bbls. each. Two by the Kent-Middleton on the Strelsky lease about 5 bbls. each. Clear Lake Oil Co.'s No. 16 Coulter 16 bbls. Triangle Oil Co.'s No. 4 Coulter is thought good for about 30 bbls.

Zapata County

R. R. Clark who some months ago bought the little Charco Redondo shallow field with wells producing several barrels at a depth of about 160 feet has completed a well a little to the northeast at about 100 feet greater depth and got a bigger producer and J. L. Hatcher a little farther to the northeast has completed another at about 250 feet which is thought to be good for around 10 bbls. Clark now has about 50 or more shallow wells and considerable storage. The field is considerably removed from transportation being in the southeast corner of Zapata County. Clark has been pumping his wells steadily and drilling more. Humble has now started erecting a 55,000-bbl. tank there to store the oil until the pipeline can be extended, probably from Randado which is about 18 miles.

Mirando Field

Of 10 completions in the various pools of the Mirando Field in Webb and adjoining counties last week, 7 were oil wells with a flush production of 2,815 bbls., and of this 4 in the Randado pool were accountable for 2,300 bbls. E. L. Smith Oil Co. and C. O. Maddox completed their Nos. 11, 12 and 14 Palacious at 1,291, 1,290 and 1,309 feet, respectively, and each swabbing 500 bbls. daily. Magnolia completed No. 12 Palacious, in the northwest corner of Block 6 of Survey 291, swabbing 800 bbls. daily at 1,280 feet. Simms Oil Co.'s No. 15 Palacious and Grayburg Oil Co.'s No. 6 Weil were each small gas wells.

In the Bruni tract extension of the Aviator Pool, on Block 44, Sun Oil Co. got a well swabbing 350 bbls. at 1,690 feet. Both the Sun, which has north half, and Associated Oil Co., which has south half, of block 44, drilled failures and near failures on that block, which seemed to mark a limit to the south edge of the pool. In the center of the block offsetting each other, Associated two weeks ago brought in a 300-bbl. well, and Sun now gets a 350-bbl. well.

Crown Central-Staley & Wynne's No. 4 "B," in Block 14 of the Bruni tracts, got a 15-bbl. well at 1,732 feet, and Murchinson & Fain got a 150-bbl. well at 1,579 feet in No. 2 Garcia, in Survey 58 in the Mid-Ojuelos Pool. George M. Ball's No. 5 Puig, on Block 73 in the Aviator extension, which was completed sometime ago as a gas well, is flowing about 200 bbls. of oil.

Houston Oil Co. completed its No. 6 Benavides, in the Cole Field a mile south of oil production, at 1,690 feet, estimated at 40,000,000 feet of dry gas.

For the week ending Saturday, September 25, there were 135 tests listed in Webb, Zapata, Duval, Jim Hogg and Starr Counties. For the week ending Saturday, October 2, there were 116 listed in the same counties.

Cole Field—Duval

In Survey 319 in Duval County in the Cole Field, O. W. Killam has spudded in No. 6 Lopez, 2,050 feet from the east line and 150 feet from the north line.

Piedras Pintas

In the Piedras Pintas Salt Dome area in Duval County, Humble Oil & Refining Co.'s No. 6 Walsh, second well to make a producer, has been placed on the pump and made 116 bbls. in 10 hours. Discovery well of the field was Humble's No. 4 Walsh, completed December 20, 1925, and which is averaging 275 bbls. daily. In Survey 531, Humble Oil & Refining Co.'s No. 1 Becher, is drilling in shale at below 2,971 feet. Production depth of the discovery well is at 3,623 feet and of No. 6, at 3,594 feet. Gulf Production Co. is making location for No. 1 Tinney.

Randado Pool—Jim Hogg

In Block 15, Survey 81, of the Randado Pool, Grayburg Oil Co.'s No. 6 Weil, at 1,542 feet, made a small well, and on the same block, Grayburg is rigging up for No. 7 Weil. Houston Gulf Gas Co., in Block 11, Survey 291, is No. 12 Palacious, which is a deep test, is drilling at 2,750 feet. Johnson and others', in Survey 291, Block 3, are moving on for No. 13 Palacious and have made location for No. 14 Palacious. In Block 2, Survey 291, they are moving on for No. 16, and made location for No. 15 Palacious. M. J. Bashara's No. 2 Weil, Survey 81, Block 8, has set casing. Simms Oil Co.'s No. 15 Palacious, Survey 291, in the Simms block, is drilling at 600 feet, and No. 5 Weil is drilling at 1,200 feet. No. 5 Weil is in Survey 81, Block 16, and No. 6 Weil, in Block 8, is a location, and on Block 7, No. 7 Weil is a location. Magnolia Petroleum Co.'s No. 8 M. S. Bank, Survey 415, is coring at 1,255 feet in sand, and No. 12 de la Garza, Survey 291, has set casing at 1,286 feet. Smith-Maddox, NW Survey 291, have set casing at 1,276 feet in No. 5 Palacious, and are drilling in sand at 1,285 feet in No. 8 Palacious. No. 11 Palacious is setting casing at 1,277 feet. No. 12 Palacious has made location. No. 13 Palacious is location. No. 14 Palacious set casing at 1,291 feet. All wells of Smith-Maddox are on the lease just north of the Simms block in Survey 291 of the Randado Pool. Alworth Brothers in Survey 39 have derrick up for No. 1 Garza, 150 feet from the north and east lines.

Henne, Winch & Fariss Pool

In Jim Hogg County in the Henne, Winch & Fariss Pool, Magnolia Petroleum Co.'s No. 14 Killam-Martinez, Survey 276, has spudded in 300 feet and of No. 2, and derrick is up for No. 15 "B" Martinez and location is being made for No. 16 "B" Martinez. Humble Oil & Refining Co. is drilling at 1,486 feet in No. 1 Velva, Block 5, Survey 5. Ryan-Ryeade interests' No. 4 Vela, Block 12, Survey 1, is moving on for test.

Kitselman & St. Albans Pool

K. & S. Corp. in Jim Hogg County is testing No. 46 Holbien at 2,047 feet. Well is in Block 13, Survey 15. In Survey 11, Block 5, K. & S. Corp. is moving on for No. 48 Holbien, making location for No. 49 Holbien and drilling at 450 feet in No. 50 Holbien, Survey 16, Block 19.

Bruni Tracts—Webb

On Block 14 of the Bruni tracts in Webb County, Crown Central-Staley's No. 4 "B" Bruni set casing at 1,716 feet and tested dry at 1,730 feet. Harper and others' No. 1 Bruni, Survey 835, made 2,000,000 feet of gas at 1,660 feet and is drilling deeper. O. A. Topham's No. 1 Bruni, Block "C," Survey 2,048, is drilling at 1,050 feet. In Block 44, Sun Oil Co.'s No. 6 Bruni is in sand at 1,683-89 feet. Crown Central Oil Co.'s No. 18 Bruni, Block 44, has spudded in. Evans and others have made location for No. 1 Puig, east of Kirkpatrick tract on Puig ranch. Associated Oil Co.'s No. 4 Bruni is moving on. Verdine and others' No. 1 Bruni, Survey 123, which made a small gasser at 1,501 feet, is drilling deeper at 1,635 feet.

Mirando Old Field

Crown Central Oil Co., Survey 668, Lot 56, No. 10 Garcia is fishing at 3,200 feet and derrick is up on Block 27 for No. 13 Garcia. Murchison & Fain's No. 2 Garcia, Survey 58, is coring at 1,822 feet.

Carolina-Texas

Associated Oil Co.'s No. 1-B Webster is drilling at 2,098 feet. Well is located on Survey 684. The Texas Company's No. 2 Webster, SW NE, Survey 684, made gas well with oil spray at 2,614 feet and is drilling at 3,028 feet. The Texas Company's No. 1 Webster, north offset to the discovery well, which made a small gasser at 2,614 feet, is temporarily abandoned at that depth. Moody Oil Corp.'s No. 1 Benavides, SW NW, Survey 680, is drilling at 3,300 feet. Hazlit-Simmons' No. 1 de la Garza, Survey 335, Block 11, tested dry at 2,325-40 feet. U. S. Gas & Oil Co.'s No. 1-S Benavides, Survey 679, is fishing at 2,765 feet. Killam-Winch's No. 2 de la Garza, Block 11, Survey 336, bailed dry at 3,044 feet and is drilling deeper. Magnolia Petroleum Co.'s No. 1 Webster, NE NW, Survey 684, is drilling at 2,775 feet. S. O. M. Oil Co.'s (Morgan-O'Hern & Concord) No. 1 Webster in south 15 acres of Survey 684, tested dry at 2,640 feet and is temporarily abandoned. O. W. Killam's No. 1 de la Garza has resumed drilling at 2,590 feet. Location is on Survey 678.

Cole Gas Field

In Cole Gas Field in Webb County, Associated Oil Co. has made location for No. 1 S. Benavides in S. Benavides tract, 600 feet from the northwest and northeast lines. In Survey 16, Block 1, Houston Oil Co.'s No. 6 Benavides is in sand at 1,684-90 feet. Location of No. 2 Benavides in Survey 16, Block 3, has been temporarily abandoned by Cole Petroleum Co. and also location for No. 3 Benavides, Survey 11, Block 13. It has also temporarily abandoned No. 23 Benavides, Block 9, Survey 8, at 2,225 feet.

SOUTHWEST TEXAS WILDCAT TESTS DEVELOP SHOWINGS DURING WEEK

By B. D. Stevenson

SAN ANTONIO, Tex., Oct. 4.—Wildcat operations in southwest Texas the past week developed nothing more than some showings, with the probability that casing will be set in some scattered wells and tests made. O'Hern & Seacord in Survey No. 174 in Duval County, 6 miles south of the Cole oil and gas field, who were expected to test early last week with some possibility that it would be an oil well and open a new pool, had a bad cement job and had to recement.

The X. K. Stout well in Edwards County, drilling in the Pennsylvanian, which last week had a showing at 4,225 feet, found only a little oil-bearing formation there, but was encouraged to continue drilling, and this week is somewhat below 4,300 feet.

The past week Earl B. Reynolds' No. 2 Butler in Karnes County, 4 miles west of Runge and on the west side of the San Antonio River south of the Southern Pacific tracks, while feeling ahead for a sand picked up a showing of oil at 1,917 feet and was setting casing late last week, intending to test out the first of this week. In No. 1 well, located 1,000 feet north, a showing of gas was had at below 1,600 feet, and it was that sand this well was feeling for. The well is 50 miles or more from any production.

In Gonzales County, Martin Oil & Development Co. picked up a little showing of oil at 1,017 feet and was rat-holing ahead to see how much there was of it. It is in southeastern Gonzales County. Scott & Kercheval, in southwestern Gonzales County, picked up a sand showing oil at 1,068 feet and were last drilling at 1,117 feet in broken sand and shale and expecting to decide by Saturday whether or not to set and test.

In Live Oak County at Three Rivers, Simmons Oil Co. (Henderson Coquat) picked up a showing at 800 feet, but decided there was not enough of it and is drilling ahead for a 1,300-foot sand.

Medina County Showing

In Medina County, Western Gas & Fuel Co.'s No. 1 Adams, drilling a half mile northeast of the No. 3 Adams of Henderson & Holden, the closest of the four gas wells completed there at around 1,000 feet, picked up a showing of oil at 1,021 feet with some water. It at least proves that the gas area doesn't run that

(Continued on Page 94)

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Expect Increase in California Output

Refined Market Situation Becoming Stabilized, But Gain in Crude Production of 20,000 Bbls. Daily Anticipated

By L. P. Stockman
Staff Correspondent, California Fields

LOS ANGELES, Calif., Oct. 2.—It is rather difficult to determine the most interesting development in California during the past week or 10 days as the three most important phases of the industry, drilling, producing and refining, vied with each other for recognition, but, because of its immediate effect, the mild price war which has been raging was perhaps the most important development which transpired during the period in question. The major refiners are emphatic in their denial of the existence of a price war of any kind, but the fact remains that gasoline prices have suffered a very drastic reduction. It is hardly necessary to go into any detail, except possibly to mention the changes made and the territory covered. The Pacific Coast has witnessed a silent battle during the past year or so for supremacy in refined oil sales between several of the largest companies operating in this territory and competition of this nature is not conducive to higher prices.

Aggressive Sales Campaign

The Richfield, Shell and Standard have been engaged in a rather interesting and aggressive campaign to build up gasoline sales on the Pacific Coast and the success which the Richfield has attained is a matter of record. The writer is not in a position to verify or substantiate the charges and counter charges of unethical competition between practically all of the major marketers nor does he desire to comment on the sales policies of the various refiners. The present unsettled condition in the refined oil market existing on the Pacific Coast is due primarily to the overproduction of crude oil which started back in 1923, and has continued unabated since that time.

The writer has continually called attention to this condition since the advent of the larger fields in southern California and, although it seemed likely early this year that the industry in California might recuperate, this was not destined to occur due to a variety of reasons, not the least of which was the abundance of oil and keener competition among marketers. I see no relief for operators at present, especially in view of the fact that an increase in the State production of around 20,000 bbls. a day is anticipated during the coming winter months when consumption of refined oils is normally at its lowest point. Economic conditions on the Pacific Coast are exceptionally favorable, in fact one eminent authority has stated that this section of the country has not perceptibly reflected the somewhat depressed conditions existing in other areas. Were it not for this factor the situation would no doubt be a serious one as the only encouraging feature has been the 15 per cent increase in normal gasoline consumption.

In addition to the overproduction situation, the desire on the part of several companies to extend their distributing facilities has also been a big factor in creating the present unsettled condition. It is just simply a case of too many service stations in a given area and this competition is bound to result in lower prices. It is impossible to anticipate at this time what conditions will prevail during 1927, but it is needless to say that the outlook is not any too bright, at least as far as the first few months of the year are concerned. From a production standpoint the State will still have a surplus over normal requirements and, while it may be possible to dump some of this oil on the Atlantic Seaboard, this is dependent upon conditions which cannot be foreseen at the present time. There are too many factors to be considered and the production end of the situation can therefore be eliminated from consideration. It might not be amiss to call attention to the fact, however, that the Inglewood and Dominguez fields have deeper horizons which have not been developed up to the present time due to the desire on the part of operators to create a future reserve.

Big Crude Supply

The recently discovered Seal Beach Field, extension work and deeper drilling at Huntington Beach and further development in the Ventura Avenue district, together with the possibility of drilling up the deeper horizon at Inglewood, should tend to keep the crude oil supply ahead of the demand. As stated above, however, this is dependent on the conditions prevailing during 1927 and the policy of the various companies involved. In other words, if development work goes along unrestricted, there will undoubtedly be a surplus during the early part of next year, but of course conditions may change somewhat during the next several months. It is fairly safe to say, however, that the State production will not drop much below 600,000 bbls. a day for at least six months. The shut in production at the present time is around 50,000 bbls. a day and it is hardly likely that this figure will be disturbed, especially in view of the fact that most of this oil is of a heavy grade.

Additional installations of cracking units will afford a larger gasoline production next year, and while this may not have any appreciable effect, it is bound to exert some influence on the situation. Taken as a whole, the outlook for the rest of this year and up through the early part of 1927, is not any too bright, but then, of course, conditions sometimes change over night. Crude oil production might be curtailed and drilling operations restricted by some of the larger producers and shipments to the East Coast stimulated, but it is hardly likely that this will solve the unsettled condition prevailing along the Pacific Coast because of the ambitious program projected by one or two of the larger refiners in their efforts to become important factors in the refined oil market. When these additional service stations are put up competition will be that much keener and may force competing companies to maintain crude oil production at a fairly high level in order to be in a position to meet the low prices which would ordinarily prevail.

Gasoline Market

The gasoline market at the present time, while it is very soft, seems to have become a little more stable, although some further changes are anticipated due to the variety of prices prevailing. In San Francisco, for instance, quotations vary from 19 to 22 cents, with most of the larger companies striving to maintain the latter figures. The Richfield, at last reports, was underselling competitors at all points except in the Los Angeles area where the Union is retailing at 16½ cents, as compared with 17½ cents asked by other companies. It is a matter of conjecture just what the outcome will be, although some are inclined to think that a cut in crude would have a tendency to stabilize refined oil prices. The Standard, however, will probably maintain present crude oil prices as long as possible as this company, in contrast to some of the marketers, produces considerably more than it buys under contract and is therefore in a very advantageous position. The pendulum may swing in either direction, however, as the present low gasoline prices are all out of line with existing quotations on crude oil.

Huntington Beach

The most important development in California during the week from a drilling standpoint was the completion of two good flowing wells in the deep sand in the southwest extension of the Huntington Beach Field. These two wells definitely proved up the existence of a rather prolific horizon capable of yielding wells good for at least 1,000 bbls. daily. The first well to come in this week was E. J. Miley's No. 2 Pacific Electric, but it was followed a few days later by George F. Getty's No. 4 Coffin. The former came in barefooted from 3,834 feet and, although it started off doing around 2,000 bbls. daily, it has been making 1,350 bbls. a day consistently since completion. The oil tests 25.2 degrees and shows a cut of 3 per cent. Miley had already taken his No. 1 Pacific Electric off production in the upper zone and this well, together with Nos. 3 and 4, is being carried on down to the lower horizon, with a good chance of coming into production within the next two weeks.

George F. Getty's No. 4 Coffin, the third well to be finished in the deep sand in the southwest extension, was an exceptionally good one, making 1,690 bbls. of clean 25.8 gravity oil from an even 4,000 feet. In contrast to Miley's No. 2 Pacific Electric, which is producing from approximately 600 feet of open hole, No. 4 Coffin has a 6¼-inch oil string carrying 765 feet of screen. Getty has four other drillers in the extension, two of which, Nos. 5 and 6, should be finished within the next two or three weeks. The Standard should also finish several deep zone wells in the extension during the next two or three weeks and it is quite possible that one or two will be tanking oil within the next few days. The company has taken both Nos. 1 and 2 off production in the upper zone and they, together with No. 1 Anderson, No. 1 Crawford and Nos. 3, 4, 5, 6, 7, 8 and 9, on the Huntington property, are al-

IMPORTANT SOUTHERN CALIFORNIA WILDCATS

Company, Well, Location—	S	T	R	Depth	Status—
Union, No. 1 Bryant, Seal Beach	2-	5-12		5,600	gr. sd. unfav.
Marine, No. 1 Strong, Bellflower	24-	3-12		5,129	br. sh. unfav.
Feather, & Preston, No. 1 Blinn, Clearwater	16-	3-12		4,185	suspended.
Union, No. 1 Howland, El Segundo	24-	2-15		5,197	recovered fish.
Smith Pet. Co., No. 1 Johnson, Hawthorne	17-	3-14		4,660	hd. sd. drlg.
Associated, No. 1 Cypress, Inglewood	34-	3-14		3,958	oil sand.
Dominguez Exten., No. 1 Compton, Dominguez	27-	3-13		180	sd. drilling.
Rine, H. E., No. 3 McDermott, San Bernard'o	32-	2- 8		501	hd. sd. drilling.
Milham Explor., Well No. 2, Del Rey	34-	2-15		6,061	hd. sd. unfav.
Barnsdall, No. 1 Merlo, Puente	35-	1-11		4,503	hd. sd. suspend.
Petroleum Sec., No. 1 Sesnon, San Fernando	14-	2-16		4,060	hd. sd. drilling.
Standard, No. 1 University, San Fernando	15-	2-15		4,209	set 10-inch.
Standard, No. 1 Austin, Topanga	11-	1-17		1,600	hd. sd. drilling.
Union, No. 1 Saugus, Saugus	15-	4-16		4,010	bd. sh. drilling.
Union, No. 2 Olinda, Orange Co.	10-	3- 9		5,656	unfavorable.
Oceanside Oil Co., No. 1 Pacific, San Diego	23-	11- 5		3,126	cleaning out.
Halfhill Packing Co., No. 2 Jeffries, Burbank	2-	1-15		1,250	suspended.
So. Calif. Drlg. Co., No. 1 Matteson, El Segundo	1-	3-15		120	hd. sd. drilling.
Calif. Pet. Dev., No. 1 Spitz, Capistrano	2-	8- 8		2,096	gr. sd. suspend.
Petroleum Sec., No. 1 DeBaker, Bandini	18-	2-12		1,080	sd. sh. drilling.
Van Nuys, No. 1 Community, Van Nuys				3,860	hd. sd. drilling.
Julian, No. 1 Mosier, Athens	12-	3-14		132	tech. spud.
General Pet., No. 1 Lomita, Sunset Beach	19-	5-11		....	mtl., bldg. rig.

IMPORTANT NORTHERN CALIFORNIA WILDCATS

Taylor, W. W., No. 1 Clovis, Fresno County	5-	13-22		1,348	hd. sd. drilling.
Associated, No. 2 Huron, Fresno County	20-	19-17		1,225	clay, drilling.
Federal Explor., No. 1 Kinsella, Tulare Co.	15-	22-24		2,900	br. sh. gas show.
Bolsa Chica, Well No. 1, Kettleman	30-	23-19		2,360	oil sand, testing.
Marland, No. 1 Elliott, Kettleman	12-	22-17		5,570	reaming.
South Coalinga, Well No. 1 Kettleman	35-	24-19		1,390	set 12½-inch.
Shell, No. 1 Berlywood, Moorpark	32-	3-20		6,460	unfavorable.
C. C. M. O., No. 1 Hobson, Ventura Co.	22-	3-24		5,855	bad fish. job.
Milham Explor., No. 1 Sexton, Ventura Co.	19-	3-22		6,121	hd. sd. drilling.
Milham Explor., No. 1 Buttonwillow, Kern	8-	28-23		260	sd. drilling.
Standard, No. 1 Palmer, Santa Barbara	13-	9-23		2,845	cemented.
Standard, No. 1 Carmarillo, Ventura County				2,818	conglom. drlg.
Pan American, No. 1 White, Monterey County	27-	23-13		2,610	hd. sd. drilling.
Pyramid, No. 1 Trescony, Monterey County	26-	21- 9		2,980	gr. sd. drilling.
Shell, No. 1 Murphy, Petaluma	29-	5- 6		2,878	hd. sd. drilling.
Miley Explor., No. 2 Casitas, Ventura Co.	7-	3-25		604	fishing.
Miley Explor., No. 1 Goleta, Santa Barbara	3-	4-29		....	rig, rigging up.
Rio Grande, No. 1 Canet, Ventura County	9-	3-23		1,735	fishing.
Sentinel, No. 1 Tejon, Ventura County	5-	5-17		562	suspended.
Woodward & Sheedy, No. 1 Famosa, Kern Co.	29-	27-26		1,916	bl. sh. drilling.
Henderson Pet., No. 2 Piru, Ventura County				1,150	sd. sh. drilling.
Ozena, No. 1 Allensworth, Tulare County	26-	24-24		500	hd. sd. drilling.
Union, No. 1 Gill, Famosa	8-	28-27		502	sd. sh. drilling.
Parkford, E. A., No. 1 Strathern, Ventura				....	rig, rigging up.
Star Petroleum, Well No. 1, Ventura	13-	3-23		....	location.

TANKER SHIPMENTS FROM LOS ANGELES TO ATLANTIC AND GULF COAST PORTS

Commodity—	Total This Week	Daily Average	Total Last Week	Daily Average	This Yr. to Date	Same Time Last Year
Crude oil	75,307	10,758	286,484	40,926	9,054,442	11,517,944
Fuel and gas oil	295,544	42,221	198,495	28,356	7,918,484	237,873
Gasoline	76,842	10,977	164,762	23,537	5,468,618	6,177,769
Tops	.....	.....	72,530	10,361	147,149	484,650
Coastwise—						
Crude oil	303,448	43,350	264,403	37,772	17,152,343	24,317,215
Fuel and gas oil	181,259	25,894	126,271	18,039	8,080,818	8,571,255
Gasoline	130,165	18,595	79,278	11,325	5,607,422	3,776,299
Kerosene	2,345	335	.....	.....	196,554	244,136
Tops	.....	.....	.....	.....	620,124	144,256
Exports—						
Crude oil	129,758	18,537	226,612	32,373	4,340,012	1,786,864
Fuel and gas oil	580,138	82,877	224,033	32,005	13,631,852	11,569,589
Gasoline	.....	.....	97,644	13,949	3,747,177	2,942,523
Tops	.....	.....	.....	.....	96,552	170,407
Kerosene	95,871	13,696	118,568	16,938	1,974,540	1,883,274

TANKER SHIPMENTS, SAN FRANCISCO TO ATLANTIC AND GULF COAST PORTS

Fuel and gas oil	78,326	11,191	146,658	20,951	1,329,618	218,414
Gasoline	.....	.....	.....	.....	768,222	1,036,369
Tops	.....	.....	.....	.....	229,775	794,918
Lubricants	.....	.....	59,611	8,516	335,228	235,533
Coastwise—						
Fuel and gas oil	121,154	17,308	207,115	29,588	3,405,799	2,835,802
Gasoline	118,938	16,991	130,299	18,614	3,460,439	1,922,226
Kerosene	6,694	956	.....	.....	283,276	145,776
Exports—						
Fuel and gas oil	.....	.....	47,915	6,845	2,529,165	1,979,685
Gasoline	58,785	8,398	.....	.....	1,225,466	459,361
Kerosene	75,210	10,744	.....	.....	1,537,771	617,452
Lubricants	.....	.....	.....	.....	8,759	243,429

ready headed downward. Nine of the Standard's drilling projects in the extension are below the 3,000-foot level and five of these nine wells have already passed the 3,500-foot level. The company located eight new wells during the week and, although material is not yet on the ground, it is a foregone conclusion that no time will be lost in getting under way.

True to expectations, the Petroleum Securities is stepping right along with its drilling program covering 10 wells in the extension, every one of which is below the 3,000-foot level. Due to the fact that several of these wells are running neck and neck, it is impossible to determine which will come into production first, but if 100 feet of hole means anything, Nos. 1 and 2, on the Gross property should share this distinction. The Superior, Wilshire, McKeon and California Petroleum should also bring in a new well or two within the next two weeks. Several other operators, including the Julian Petroleum, are also expected to appear on the completion list. A check of present operations indicates that 44 holes are below the 3,000-foot level, while 12 are rotating ahead between 2,000 and 3,000 feet. This is about on a par with operations during the previous week. The California Petroleum has taken No. 1 Buck off production and this well, which extended the northern limits of the field approximately half a mile, is being cleaned out at 4,247 feet and will be back on production within the next week or 10 days. No. 2 Buck, on the same lease, is drilling ahead at 4,225 feet and may possibly be completed before the cleanout job on No. 1 is concluded.

Ventura

The Ventura Avenue district, without doubt the world's greatest oil field, yielded another gusher a few days ago when No. 33 Lloyd of the Associated blew in flowing 5,610 bbls. and 5,000,000 feet of gas daily from 6,261 feet. This is the largest flowing well in the State of California at the present time and, considering the depth at which production was secured, is one of the most remarkable wells ever finished. This new producer is located in the northern part of the Lloyd lease and, aside from proving conclusively that this section of the field is capable of yielding large production, it indicated that the end of the producing formation is not yet in sight at 6,261 feet. One of the most interesting features in connection with this new well is the fact that it has a penetration in the oil sand of over 1,200 feet. The Associated has two or three additional wells which should be in a position to make a bid for production within the next few weeks unless the company decides in the meantime to explore a little further.

The General Petroleum should also have a well or two on production within the next few weeks, although the completion of one, No. 2 Barnard, may be delayed somewhat because of a fishing job which developed at 5,644 feet. The Shell is stepping right along with its development program on the Edison, Gosnell and Taylor leases and is expected to list something like three or four wells within the next 30 days, all of which should be good for large production. The Bolsa Chica Oil Co. cemented a string of 11-inch in No. 2 Hartman late last week at 3,675 feet and moved the equipment over to No. 1 Hartman, which is being deepened from 5,434 feet down to around the 6,000-foot level in search of large production. The Ventura Associates Oil Co. has just spudded in No. 1 Hisey and it is the consensus of opinion that the well is favorably located and practically assured of production. The two wells of the Petroleum Securities in the southern part of the field both made additional hole during the week but neither has yet picked up the pay, notwithstanding the fact that the former is already down 5,560 feet.

Long Beach

There were several wells finished in the Long Beach Field during the past seven-day period but all of them were comparatively small pumpers. The General Petroleum's No. 7 K. & H., located in the older section of the field, proved a distinct disappointment when put on a test, as it gave every evidence of resulting in big production while being drilled. The well, which has several hundred feet of oil sand, failed to respond to bailing and swabbing operations of several days duration and the company was forced to put it on the beam at 5,100 feet, from which depth it is pumping 75 bbls. a day. Completions in the northwest extension were equally as disappointing, although there were one or two in the 150-bbl. class. J. W. Alford's No. 1 Cerritos, recompleted after being redrilled and deepened from the upper to the lower sand at 4,812 feet, resulted in a 150-bbl. pumper, the oil testing 21.8 degrees. Featherstone & Preston's No. 10 Cerritos, also recompleted in the deep zone after being deepened from the upper sand, registered a maximum initial daily production of 150 bbls. of clean oil when put on the beam at 4,810 feet. The Julian Petroleum's No. 1 Burman & Green was recompleted at 4,828 feet, from which depth it is pumping 92 bbls. a day, the oil testing 20.1 degrees and showing a cut of 10 per cent.

No. 4 Cerritos, of the Lindauer Oil Co. started off pumping for several hours at the rate of 200 bbls. a day but it sanded up a short time later and it is being cleaned out to bottom, 4,879 feet. The Repetto Hills Oil Co. has concluded its drilling program in the extension by returning No. 4 Cerritos to production as a 40-bbl. pumper. This well was given a chance to come in under a natural flow from the deep sand at 4,828 feet but it did not have sufficient kick and only resulted in a small pumper when put on the beam. The Reliance Home Investment Co. did not make any attempt to secure oil production but instead finished its No. 1 Cerritos as a gas well making a little better than 2,000,000 feet daily from 3,140 feet. The output, including 150 bbls. of water, is flowing through a half-inch bean under a pressure of 1,500 pounds. Walker, Wilson & Gordon recompleted No. 4 Cerritos, formerly the Retsof Drilling Co.'s No. 82, in the deep sand at 4,833 feet and the well is pumping 115 bbls. of clean 22.1 gravity oil daily.

Walter P. Temple has apparently failed in his attempt to develop a third producing horizon in the extension and, although one or two stringers were logged at 5,790 feet, the well flowed hot salt water from this depth. It is not believed that any further attempt will be made to test out this sand, in which event the casing will probably be perforated around 4,850 feet in an effort to secure production from the second zone. The Pan American's No. 2 Chainey, in the older section of the field is scheduled to be given a production test from the 5,300-foot level within the next two weeks and, although approximately 300 feet of oil sand has been logged, it is problematical just what this well will produce due to the fact that the immediate area has been fairly well drained for the past two years. Miller & Haley, who have been attempting to pick up a further extension of the Long Beach Field, suffered a temporary delay this week due to the buckling of their steel rig which weakened under the strain of attempting to loosen the drill pipe which has become frozen in the hole. The derrick is being reconstructed and work will probably be resumed within the next two weeks.

Inglewood

The Standard added another pumping well to its list of producers in the Inglewood district by bringing in No. 59 on Los Angeles Investment Lease No. 1 and, although the output, 300 bbls. of 18.3 gravity oil daily from 2,185 feet, is cutting approximately 20 per cent, it is believed that the well will clean up to some extent after it has been on production some time longer. Drilling in this field has been of a rather spasmodic nature during the past several months and, although new wells have been spudded in from time to time, the interval has been quite infrequent. The Standard's No. 7 Stocker, the only drilling project in the field at the present time, will probably go on production within the next two weeks as it has just passed the 2,000-foot level. Development work in the Dominguez Field is quite similar to operations at Inglewood, although the small amount of drilling in the former area is due to the desire of operators to create a reserve rather than because of the fact that the field has been nearly all drilled up, as is the case at Inglewood.

The Chanslor-Canfield Midway Oil Co. finished another comparatively small well on the Del Amo lease at Torrance when No. 55 was put on the beam at 5,0[illegible]

(Continued on Page 328)

DUTTON DOME WELL A PRODUCER; MAY OPEN UP NEW WYOMING FIELD

By Frank B. Taylor
Staff Correspondent, Rocky Mountain Area

CASPER, Wyo., Oct. 2.—The Dutton Dome well of the Midwest Refining Co., near Laramie, Section 1-18-78, has reached the Muddy sand at 4,900 feet and it appears the well is a producer though at this writing it is impossible to estimate what it will do.

This structure was worked out by Max Ball for the Argo Oil Co. Then the Midwest Refining Co. became interested and agreed to develop the geology with a drilling machine. The development of the geology, under the direction of John Bartram and others of the Midwest geological department, uncovered a well defined structure which was overlaid on the surface with Tertiary so that the geology was hidden except for one small outcrop.

On the strength of this hidden dome, the Midwest Refining Co. put down a well and this well has now reached the Muddy sand at the depth noted and found oil. The sand proved to be only 18 feet thick at first, but as the drill went on a second layer was found that showed up both gas and oil, although there was no gas in the first stratum of sand.

At a depth of practically 5,000 feet, the sand on Dutton Dome must produce large wells to make a commercial field. The cost of drilling a well to that depth runs about $150,000 and the initial production should be around 1,000 bbls daily to pay out. Although the strike at the Dutton Dome well would mean a commercial producer as it stands at a depth of around 2,000 feet, so far it is questionable whether it will make a commercial producer or not.

In case the well proves worth while and opens a new field, the area computed from the records of the shallow holes drilled is thought to be 2,600 acres.

This development is considered to be a striking example of the work of competent geologists in unraveling the mysteries of nature. Starting from only a small outcrop on the surface and obtaining their information of a hidden structure by the drilling of 27 shallow holes ranging from 50 to 200 feet in depth, the Midwest men under the direction of John Bartram worked out the underlying structure and even made up a column before drilling, showing what the first well would encounter.

It is expected if the Midwest well turns out as expected and opens a new oil district in the southern part of Wyoming that the whole state and adjoining states will be gone over again as in the earlier days and many similar hidden structures found by core drilling to shallow depths. With the records from shallow core drill holes, the geology of a given area can be worked out with more precision than when the dips and strikes are taken from escarpments on the surface. In the latter case, the original structure of the dome must be computed, but in the case of surface geology, the structure is found *in situ*.

Moab District, Utah

The discovery well of the Midwest and the Utah Southern Oil Co. on the Cane Creek Dome in Utah, has reached a depth of 3,990 feet and is setting casing. The hole is in salt and some repairs will have to be made to the rig and machinery before drilling is resumed.

The second test in the Moab district, the Shafer Dome well, about 5 miles south of the Cane Creek Dome, is underreaming at 2,150 feet and will set the 10-inch pipe at 2,350 feet. There is no show of oil or gas yet in this well, although the hole is well below the depth at which the sand that carried the oil at the Cane Creek well came in. The Cane Creek well found its production at 2,000 feet and when the Shafer Dome well was started it was computed by the geologists that the Shafer well would find oil at less than 2,000 feet as the strata were higher on the Shafer structure.

The Cedar Mesa test of the Utah Southern Oil Co. and the General Petroleum Co. in San Juan County, Utah, is spudding at 105 feet and the Utah Southern

(Continued on Page 341)

TEST IN ANDERSON COUNTY GETS ATTENTION; BAZETTE LOOMS AGAIN

By Special Correspondent

MEXIA, Tex., Oct. 4.—The production of the Nigger Creek Field for the week ending Saturday, October 2, averaged 12,000 bbls. a day. Powell was 3,700 bbls.; Mexia 12,090 bbls.; Wortham 6,025 bbls. Richland 1,600 bbls. and Currie 675 bbls.

The fast falling production of the Nigger Creek Field took an upward turn in midweek when it reached 13,700 bbls. a day, or 2,000 bbls. above what it had been reported earlier in the week. Of this total the Transcontinental Oil Co. claimed over 8,000 bbls.

The most interesting test in Limestone County is the Grayburg Oil Co.'s No. 1 Riddle, Varella Survey (a 115-acre lease) which is drilling south of and across the Navasota River from the Nigger Creek Field. Since the Transcontinental Oil Co.'s No. 1 Medlock and the same company's No. 3 Erskine came in many are of the opinion that there is a good chance of the field extending south and across the river, therefore the Grayburg test will be closely watched as it proceeds downward.

The Pure Oil Co.'s No. 3 Mrs. Atkins, Varella Survey, Nigger Creek, swabbed 200 bbls. the first 24 hours from sand at 2,830 feet, total depth 2,836 feet. The Atlantic Oil Producing Co.'s No. 2 Rossen, Varella Survey, swabbed 138 bbls the first day at a total depth of 2,844 feet, top of the sand at 2,837 feet. The Simms Oil Co. got a dry hole in its No. 1-A Rossen (north 10 acres), Varella Survey. The top of the chalk was 2,475 feet and was penetrated at 2,666 feet. The hole was drilled to 3,110 feet, where it was abandoned. The Transcontinental Oil Co.'s No. 3 Erskine, Varella Survey, made 463 bbls. the first 24 hours from sand at 2,824-31 feet. The same company's No. 3 Medlock started at 650 bbls. a day from sand at 2,801-09 feet. Its No. 10 Rossen, Block 3, Varella Survey, was a 350-bbl. initial producer at 2,833-41 feet. The Transcontinental's No. "A Rossen, was good for 480 bbls. the first

(Continued on Page 328)

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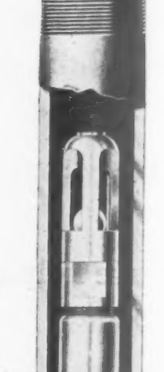

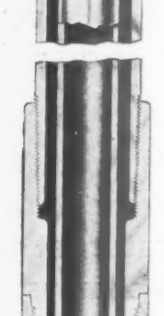

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The original Elliott Core Drill was generally accepted as the best tool of its kind at that time. In the years which have followed the entire Elliott organization—an organization of coring specialists—has been intensively engaged in developing and perfecting oil well coring operations, and of necessity, the tools with which to do this work.

That you may have just a fragmentary idea of the depth and scope of this development work let us point out that more than two years were spent in the development of a type of thread for the cutter head and cutter body which would prove entirely satisfactory for this purpose. The core catcher was not completely perfected until five years after the advent of core drilling. One of the principal reasons for the exceptional performance of the Elliott-Alco Core Drill resulted from a variation of only one and one-half inches in the placement of certain cutting teeth.

These things are features of the Elliott Service that is continuously being rendered to the petroleum industry year in and year out which are invisible and yet are quickly apparent in the results obtained by Elliott clients. And they tend to show the economic necessity for this same intensive, specialized service; today in order to obtain the maximum results which it is only natural to assume can better be insured by highly specialized skill and craftsmanship than otherwise; and tomorrow to insure continued advancement in coring operations in step with changing conditions and requirements in oilfield practice.

Today the Elliott-Alco Core Drill is unquestionably the outstanding tool of its kind, a perfected device of scientific design and precision manufacture, as yet unequalled in results obtained. And Elliott Service is a definite part of our business because years of intensive specialization have proved that it is essential to *maximum coring efficiency and results.*

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Coshocton County, Ohio, Active Area

Gets 100-Bbl. Well and Operators Are Busy. Washington County, Pennsylvania, Has Best Producer in Two Years

By D. S. Wakenight
Staff Correspondent, Eastern Fields

PITTSBURGH, Pa., Oct. 4.—It is quite probable the year will close without the discovery of a new pool. Few operators will have secured a larger production than at the beginning of the year. The large number of wells completed from month to month has not brought to the surface enough new production to more than meet the decline in the old wells.

There is but one section, Henry district, Clay County, West Virginia, that has not been defined. No other district in West Virginia is furnishing so much new production, and due largely to the staying qualities of the old wells. Some wells, completed several months ago, are producing almost as much as when first completed. One reason for this is that the territory is held by the larger operating companies and has been developed conservatively.

The deep sand territory in southeastern Ohio has not been fully developed and will continue the best source for new production in the eastern fields. Much of the recent work completed is testing leases to see if productive, and, if so, hold it in reserve.

Best Wells for Week

Only two good and several fair producers were completed during the past week. One is located in the deep sand territory in southeastern Ohio and the other in Morris Township, Washington County, Pennsylvania. The good well completed in southeastern Ohio is the Preston Oil Co.'s No. 3 on the E. Ray and Otto M. Van Winkle farm, in the southwest quarter of Section 15, Perry Township, Coshocton County. It produced 150 bbls. the first 24 hours after drilled through and shot in the Clinton sand.

In Section 12, Perry Township, Licking County, the Arkansas Fuel Oil Co. completed in the same formation a 50-bbl. producer when it drilled in No. 4 on the Q. F. Montgomery farm. In the village of Perryton, same township and county, the Perryton Oil Co. completed a test on the Mead-Mayberry farm, good for 45 bbls. a day. In Lot 23, Monroe Township, Holmes County, the Pure Oil Co. completed a 30-bbl. producer at a test on the W. E. Purdy farm. In the northwest quarter of Section 17, Pike Township, Coshocton County, the Leonard Oil & Gas Co. got a 40-bbl. producer when it drilled No. 6 on the Jacob Ashcraft, Jr., farm through the Clinton sand. Recently Coshocton County has been forging to the front with good producers and new work.

The good well completed in the southwest Pennsylvania fields is Dunn & Co.'s No. 5 on the Adam Weir farm, in Morris Township, Washington County. To the surprise of its owners and others, the well is producing 100 bbls. a day. This is the best producer completed in Washington County in more than two years. It is in territory long since defined and does not open the way for additional development work. In the Gordon sand pool, in Morris Township, Greene County, several wells are due to get the sand this week, and are favorably located for good wells.

West Virginia has little to offer better than light pumpers. In Henry district, Clay County, the South Penn Oil Co. got a 30-bbl. producer when it completed and shot in the Big Injun sand its No. 36 on the O. D. Stockley farm. In the week's work more gassers than oil producers were completed. With a large amount of gas shut in, the gas companies are not active.

West Virginia

The West Virginia fields reported very few completions and none of a size to call for special mention. Clay County is still leading in development work, despite one of the largest operating companies having suspended operations and starting no new work.

In Henry district, the Virginian Gasoline & Oil Co. has completed in the Big Injun sand No. 15 on the Brown, Swann Goshorn & Geary lease, estimated good for 15 or 20 bbls. a day. The location is 600 feet southeast of the South Penn Oil Co.'s No. 26 on the O. D. Stockly farm.

Drilling to Lower Sand

In Grant district, Harrison County, 3 miles south of Clarksburg, the Hope Natural Gas Co. has started to drill an old gasser on the C. W. Lynch farm from the fifth to the Speechley sand.

Gassers in Lincoln County

In Union district, Lincoln County, the Columbia Gas & Electric Co. has a gasser in the Berea grit at a test on the Julia M. Egnor farm. In the same district, it has a gasser in the same formation at a test on the Horse Creek Coal & Mining Co.'s tract. The Union Oil & Gas Co. has a fair gasser on the William Harless farm. In Jefferson and Carroll districts, the Cambridge Gas Co. has gassers at No. 3 Cora Linville and H. H. Wade farms.

Light Gasser in Lewis County

In Collins Settlement district, Lewis County, the West Fork Oil & Gas Co. has drilled its test on the Enos Clark farm through the Gordon sand. It is a light gasser. In Clay district, Wirt County, the Roberts Oil Co. has completed in the Big Injun sand a second test on the Lenora Rex farm. It has been abandoned.

On Lower Cabin run, Grant district, Ritchie County, Mellon Brothers are drilling a test on the Charles Kerns farm. On Dry Ridge, same district, the Astron Oil Co. is rigging up at No. 5 on the Herman Stursburg Realty Co.'s property. In the same district, W. H. Bickel, Jr., is moving rig material to the location for another test on the W. H. Bickel farm.

Clay County

Henry district, Clay County, is completing a good many wells, some light and others fair producers. In this district, the South Penn Oil Co. has completed and shot in the Big Injun sand No. 36 on the O. D. Stockly farm, good for 30 bbls. a day. One of the commendable features of the old wells in this development is the way in which they are holding up.

Kanawha County

In Big Sandy district, Kanawha County, the United Fuel Gas Co. has completed tests on the Etta Wherle and E. C. Taylor farms. Both are fair gassers in the Big Injun sand. In the same district, the United Carbon Co.'s No. 4 on the Mary Bird farm is fair gasser in the same formation.

Boone County

In Sherman district, Boone County, the Pure Oil Co.'s No. 26 on the Lafollette, Robsan, Prichard tract is a gasser in the Berea grit. The same company's Nos. 1 and 4 on the Jacob D. Coon farm are both gassers. In Scott and Washington districts, same county, the Owens Bottle & Machine Co.'s No. 11 Cassingham & Co.'s tract and No. 4 on the Little Coal Land Co.'s property are both gassers. In Sherman district, Godfrey L. Cabot has gassers at test on the Laurel Creek Fuel Co. tract and Charles Lewis farm.

Logan County

In Logan district, Logan County, the Wocotock Oil & Gas Co. has completed No. 13 on the Dingess Run Coal Co.'s tract. It is a gasser good for 1,250,000 feet. No. 14 on the same tract is due in the sand on Ten Mile Creek, Union district, Harrison County. J. W. Johnston's test on the O. O. Westfall farm is a light gasser in the Big Injun sand. On the same stream, in Ten Mile district, the Hope Construction & Refining has the rig completed for a test on the S. C. Stonestreet farm. In Patterson Fork, same district, the Patterson Fork Oil Co. has the rig completed for No. 17 on the R. T. Lowndes farm.

In Walker district, Wood County, the South Penn Oil Co. has completed in the Big Injun sand No. 8 on the George F. Albright farm, good for 10 bbls. a day. In Clay district, Marion County, the Pittsburgh & West Virginia Co.'s test on the G. T. Moore farm is a gasser in the Big Injun sand. In Center district, Calhoun County, W. R. Bickel has a gasser in the Big Injun sand at his No. 5 on the James A. Ferrell farm.

Marshall County

In Liberty district, Marshall County, Guy Patterson has a gasser in the Gordon sand at a second test on the Alfred Howard heirs' farm. In the same district, the Carnegie Natural Gas Co.'s test on the William Gorby farm, drilled deeper, is a gasser in the same formation. In Sherman district, Calhoun County, the White Pine Oil & Gas Co. has a show of oil and gas in the Big Injun sand at a test on the John R. and G. B. Francis farm.

Fair Producerm in Marion County

In Mannington district, Marion County, S. N. Elliott's No. 3 on the Arlie T. Hibbs farm is good for 40 bb's. a day in the Big Injun sand. The Grant Gas Co.'s test on the Everet and P. Vickers farm, in Carroll district, Lincoln County, is a gasser in the Berea grit.

In Murphy district, Ritchie County, Ruth & Strong's No. 13 on the Alex Dunlevy farm, an old well drilled down, is good for 2 bbls. a day in the Big Injun sand. In Union district, Pleasants County, the Tyler Oil Co. has a show of oil in the Keener sand at a test on the James Northcraft farm. In McKim district, the Walnut Run Oil Co. has a gasser in the third salt sand at a second test on the H. T. Eddy farm. In Jefferson district, Dinsmoor & Co. are drilling on the Calvin Templeton farm. In the same district, H. N. Rinehart has a rig up on the Emily Rinard lot.

Southeastern Ohio

In the northeast quarter of Section 9, Perry Township, Monroe County, William McClure has a very light pumper in the Keener sand at a test on the C. S. Budannan farm.

Shallow Sand Territory

On Northup Run, Section 17, Newport Township, Washington County, the Peoples Banking & Trust Co. of Marietta has completed in the first Cow Run sand No. 10 on the Alex Thomas, Sr., farm. It is a 5-bbl. pumper. In Section 15, Franklin Township, Licking County, J. W. Weidmann & Co. have a 3-bbl. pumper in the Berea grit at No. 5 on the R. L. Tavener farm.

In Lot 24, Newton Township, Licking County, the Ohio Fuel Supply Co. completed No. 10 on the Ellen E. Forry farm. It produced 70 bbls. the first 24 hours after completed and shot in the Berea grit. In Lot 6, same township, the same company got a 30-bbl. producer when it completed No. 6 on the Orpha Hansberger farm.

In the southwest quarter of Section 20, Fallsbury Township, Licking County, the Leonard Oil & Gas Co.'s No. 3 on the M. R. Moran farm is good for 15 bbls. a day in the Berea grit. In Franklin Township, Section 7, Bishop & Co. completed No. 5 on the Martha Cutridge farm, not good for more than 3 bbls. a day.

Holmes County

In the southwest quarter of Section 12, Killbuck Township, Holmes County, the Ohio Fuel Gas Co.'s test on the C. P. Allison farm is a gasser in the Clinton sand, good for 2,370,000 feet. In the northeast quarter of Section 13, same township, the East Ohio Gas Co.'s test on the William H. Mohr farm is a duster in the Clinton sand. In the southeast quarter of Section 24, Green Township, Hocking county, the Maysville Oil & Gas Co. has completed a second test on the T. J. Mowery farm, showing for a 25-bbl. producer in the Clinton sand.

Week-End Completions

In Falls Township, Section 3, Hocking County, the Kachelmacher estate has completed a test on the George Huston farm, dry in the Clinton sand. In Green Township, the Preston Oil Co.'s test on the Almeda Linton farm is good for 45 bbls. a day. The Ozark Oil & Gas Co. has drilled in a test on the Ida M. Hall farm, showing for a light pumper.

In Section 2, York Township, Morgan County, the Sun Oil Co. has completed a second test on the Wilson Kirkwood farm, good for 5 bbls. a day in the Berea grit. In Section 26, C. F. Glazier & Co. have a very light pumper in the first Cow Run sand at No. 9 on the O. M. Lovell farm. In Section 22, Alexander Township, Athens County, Cook and others have a dry hole in the Berea grit at a test on the Lester Cordray farm.

Inside the corporate limits of Athens, Athens County, the Athenian Oil & Gas Co. has completed in the Berea grit No. 3 in Lot 2, on the J. C. Wilkins farm, good for 3 bbls. a day.

Vinton County

At Bolin Mills, Section 7, Knox Township, Vinton County, the Gordon Oil Co.'s second test on the Wesley Walburn farm produced 20 bbls. the first 24 hours after shot in the Berea grit. In the same locality, Section 1, the same company has completed in the same formation a test

(Continued on Page 78)

Summary of Statements Made September 10, 1926, Relating to Business of Various Eastern Pipelines for Month Ending August 31, 1926

	Gross Stocks	Runs From Wells	Other Receipts	Regular Deliveries	Other Deliveries
National Transit	1,095,592.29	161,322.78	717,314.23	419,519.29	414,712.89
Southwest Pa. Pipe Line	644,407.29	96,367.93	754,618.06	467,494.53	481,780.44
Eureka Pipe Line	1,426,004.54	281,142.94	358,734.01	206,253.08	570,334.90
Buckeye Pipe (Macksburg)	461,200.92	307,707.87	352.50	139,988.47	123,512.49
Buckeye Pipe (Lima, etc.)	2,585,933.06	128,103.04	1,862,958.80	787,040.76	1,040,675.29
Buckeye Pipe (Cleveland)	92,461.86	11,268.78	59,359.74	727.93	61,529.91
Indiana Pipe Line	578,735.80	10,825.64	2,155,074.20	996,002.96	1,171,412.74
Cumberland Pipe Line	601,941.96	278,950.07	.....	149,487.18	182,638.50
Southern Pipe Line	494,780.16	.....	118,580.55	2,461.03	186,956.90
New York Transit	748,135.27	20,228.51	351,236.92	437,982.40	.....
Northern Pipe Line	385,641.31	.....	663,768.60	199,543.86	510,526.04
Total, August 31	9,025,824.66	1,395,918.56	7,041,997.61	3,746,501.59	4,725,080.20
Total, July 31	9,092,061.37	1,426,995.09	7,273,431.65	4,025,670.87	4,515,269.49
Difference	66,236.71	31,076.53	231,434.04	279,169.28	209,810.71

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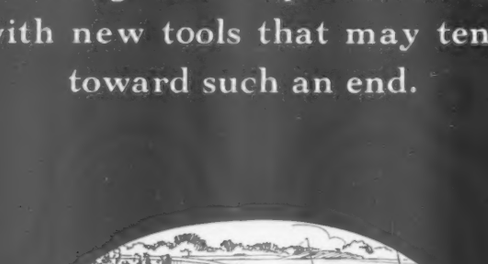

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HOUSTON LOS ANGELES

Allendale Leads Central West Field

Four of Five Completions Above the Average. Ottawa and Wyandot Counties, Ohio, Have New Producers

By Whit
Staff Correspondent, Central West Fields

FINDLAY, Ohio, Oct. 2.—The Central West Field had an unusually good week in development work, there being 43 completed wells reported, with an initial production of 917 bbls., 11 dry holes and 1 gas well. Allendale Field, of Wabash County, Illinois, had 5 completed wells, of which 4 were above the average. This includes Nos. 2 and 3, on the Joe Keier farm, at 125 bbls. each; No. 9 Kohan heirs' farm, and No. 3 Breen farm, 60 bbls. each. An 81-bbl. initial producer is reported on the Mandy Williams farm, in Logan Township, Pike County, Indiana, while the Lima Field, of northwestern Ohio, had only average wells, one in particular which brought about a slight extension to production, being on the E. E. Neal farm, Section 25, Catawba Township, Ottawa County, more than 20 miles east of the old defined lines of the Lima Field, but not far removed from production found of late in the same township. The well is credited with 15 bbls. initial from a total depth of 1,995 feet. Another producer has been added to the Wyandot County Field, a part of the Lima Field, making the second fair well for that territory. It is on the Chesbrough farm, in Section 12, Ridge Township, and did 25 bbls. naturally the first 24 hours.

Lima Field

The bringing in of a 15-bbl. producer by the Ohio Oil Co., in a test in the southeast corner of the E. E. Neal farm, in the NE. Section 25, Catawba Township, Ottawa County, and on the Catawba Island, extends the producing area of the new field a few locations. This field is approximately 20 miles east of the old production in what was known as the eastern limits of production in the Lima Field. The Neal well got the top of the Trenton at 1,895 feet, drilled 100 feet in the sand to a total depth of 1,995 feet. If this well maintains anywhere near its initial production, the Ohio Oil Co. will no doubt do a lot of development work as it has secured a large acreage.

The Eilerman Oil Co. extended the producing area of Cynthian Township, Shelby County, when it brought in a 14-bbl. initial producer 225 feet from the south line and 600 feet from the east line of the N. Simon farm, in the northeast quarter of Section 34. Sand was topped at 1,222 feet and drilled 45 feet in the sand. In this township, the Wittmer property, trustee, has started a second test on the Mary and Roginia Siegel farm, Section 15, and E. E. Laughner is drilling his No. 5 on the Theresa Goffena farm, Section 35.

In Ridge Township, Wyandot County, near the Wyandot-Hancock County line, the South Bend Producer Co. drilled in a second test in the southwest corner of the S. B. Chesbrough farm, in the southwest quarter of Section 12, and got a 25-bbl. natural producer at a total depth of 1,462 feet. Top of sand was found at 1,387 feet and drilled 73 feet in the sand. No. 1, in the southeast corner of this farm, completed last month, was a duster.

The Boston-Southwestern Oil & Gas Co.'s test on the Ira C. Schick farm, in the Roundhead Field, of McDonel Township, Hardin County, is reported at 15 bbls. The same company is drilling No. 2, same farm, as well as No. 1, on the Marguret Hoey farm. The Hardin Oil & Gas Co.'s No. 7 A. R. Zimmerman farm, same township, produced an initial of 25 bbls. In Mississinewa Township, Darke County, the Cole Oil & Gas Co. is drilling No. 15 W. G. Discher farm, Section 11; A. W. Neely and others are doing the same at No. 2 O. J. Current farm, Section 10, and R. D. Hance is drilling No. 1 on the S. V. Ainsworth farm, same section. Ira Hance is drilling a second test on the C. D. Rittenour farm, same section.

South of Maumee Bay, in Oregon Township, Lucas County, the Ohio Oil Co.'s No. 45, 900 feet from the north line and 700 feet from the west line of the Gertrude J. Niles farm, in the northwest quarter of Section 29, pumped 5 bbls. Top of sand at 1,390 feet and drilled 31 feet in the sand. John Welton is drilling a test on the Henry Vilhauer farm, Section 12, same township, and near Momineetown, same township. Fred Keister is nearing the sand at his No. 10, on the R. A. Bartley farm, Section 30.

In the Tiffin Field, in Clinton Township, Seneca County, Arthur E. Geyer is drilling a second test on his own property in Section 29. The Sun Oil Co. is reported to have pulled out all its old wells in the Tiffin Field, owing to the high tax rate there. The wells have been producing for many years and in the early days many large wells were brought in from deep down in the Trenton sand.

The only completion reported during the week from Sandusky County, was Haubert & Talbert's No. 9, located 1,050 feet from the south line and 200 feet from the east line of the Martha Talbert farm, Section 17, Jackson Township, with an initial of 5 bbls. Sand was struck at 1,262 feet and oil at 66 feet in the sand. In Madison Township, the Home Banking Co. is drilling No. 11 on the August H. Taulker farm, Section 24. Stitt, Poole & James are drilling No. 55 on their own property, near Rollersville, in Section 4, Scott Township. In the same township, the Ohio Oil Co. pulled out and abandoned No. 21, on the J. Bauman farm, Section 17, and in the same section, John M. Sherman and others of Fremont, Ohio, abandoned old Nos. 11, 12, 14, 15, 16 and 17, on the J. Bowers farm. In Jackson Township, Joseph A. Neiset and others abandoned No. 2 on the Frank J. Wammes farm, Section 17. In Sandusky County, in the Four-Mile House area, the Ohio Oil Co. abandoned old No. 12 on the Mrs. D. Hensel farm, Section 18.

The most active spot being developed at this time in the Old Wood County Field, is a couple of miles east of the Dixie Highway, several miles south of Perrysburg, in Perrysburg, where the Oko Oil & Gas Co. of Lima, keeps about four strings of tools working night and day. This company's No. 8, 800 feet from the north line and 250 feet from the east line of the George Deverna farm, and 550 feet south of No. 7, same farm, pumped 16 bbls. initial, with sand topped at 1,241 feet and drilled 50 feet in the sand. Its No. 4, on the Charles Thiess, Jr., farm, struck top of sand at 1,246 feet and at 50 feet in showed an initial of 6 bbls. This company is drilling No. 9 George Deverna farm; No. 5 Charles Thiess, Jr., farm and No. 1 J. J. Heilman No. 2 farm, all in Section 29, and No. 6 on the William Budd farm, Section 28. In Lake Township, same county, Charles F. Zeising and others are drilling No. 1 on the Otto Brim farm, Section 27, and Lantz, Schulte and others are drilling No. 4 on the H. C. Michaelson farm, Section 26, both being in close proximity to the big well recently finished near Latcha. The Ohio Oil Co. abandoned old No. 1 on the J. A. Miller farm, Section 1, same township. Same company abandoned Nos. 10 and 28 Johnson farm, Section 11, and No. 28 on the Emelia Spooner farm, same section, and is drilling No. 5 Frank Stratton farm, Section 10, all in Liberty Township.

In Henry Township, Wood County, the Ohio Oil Co. is drilling a second well on the J. P. Cleary farm, Section 21. In Montgomery Township, same company pulled out No. 6 F. E. Palmer farm, Section 11. Knisely & Bonawith did the same with No. 8 Pearl A. M. Stahl farm, Section 23, while the Thomas Painter estate pulled out No. 7 F. J. and V. H. Miller farm, Section 1. In Plain Township, same county, the Ohio Oil Co. abandoned No. 3 Thomas Rutter farm, Section 22.

In the Findlay Field of Hancock County, J. M. Steen and others' No. 25, 200 feet from the north line and 650 feet from the east line of the M. H. Deeds farm, Section 6, Eagle Township, pumped 25 bbls., with top of sand at 1,313 feet and pay at 75 feet in the sand. No. 26, same farm, is drilling. In Marion Township, Denhoff Brothers' No. 5, in the northwest corner of the Elmer Spahr farm, Section 1, pumped 5 bbls. at a total depth of 1,417 feet, or 196 feet in the sand. This firm is drilling a test on the Levi Wolfe farm, same section. In Pleasants Township, the Bath Township Oil & Gas Co. is drilling No. 3 Ann Henry farm, Section 14. In Biglick Township, Kirk & Fletcher are drilling a test on the H. B. Kurtz farm, Section 34, and the Ridge Oil & Gas Syndicate is drilling No. 2 on the Leroy Wonders farm, Section 35. In Liberty Township, the Keiser Oil Co.'s No. 2 Joe Ernst farm, Section 31, pumped 5 bbls. Top of sand 1,332 feet and 73 feet in the sand. Kirk & Discuss is drilling No. 2 M. E. Discuss farm, and Bob Kirk is drilling No. 1 William Fleck farm, both in Section 31. B. B. Porter and others are drilling No. 4 Bish farm, Section 18, same township.

Near Lima, in Bath Township, Allen County, O. T. Botkins and others are drilling No. 3 on the Hattie E. Driver farm, Section 12, and Ira B. Post and others are doing the same with a second test on the John Lenney farm, same section. In Amanda Township, the Halcyon Oil & Gas Co. is starting a test on the J. E. Bowsher farm, Section 27.

In St. Marys Township, Auglaize County, and on the north side of Lake Mercer Reservoir, the Ohio Oil Co. has abandoned No. 17 on the Emily P. Blond farm, Section 9. This lease was among the big producing farms of the one-time famous St. Marys Field. In Logan Township, Whitling & Zimmerman are drilling a test on the P. E. Zimmerman farm, Section 20, while in Moulton Township, Young & Geselchen are doing the same at their No. 8, on the W. E. Cook farm, Section 34.

Mack P. Colt and others have had quite a pulling job of old wells, in the Mercer County Field, the total being 22, consisting of Nos. 2, 3, 4, 5, 6, 7 and 8, Griffin & Boroff farm; Nos. 1, 2 and 3, B. B. Boroff farm; Nos. 2, 3, 4, 5, 6, 7, 8 and 9, G. F. Griffin farm, all in Section 1, Union Township, and Nos. 12, 13, 14 and 17 J. D. Stalter farm, Sec-

(Continued on Page 302)

HOPEWELL POOL, KENTUCKY, REVIVES; NEW AREA IN CLAY COUNTY, TENNESSEE

By Whit
Staff Correspondent, Kentucky-Tennessee

OWENSBORO, Ky., Oct. 2. — Few completions were reported from the Kentucky-Tennessee Fields during the week, the best wells being found in the Hopewell Pool, along the line of Cumberland and Adair Counties, where Wood, Haislett, McLennon and others' No 2 on the Brockman farm, is producing 144 bbls., and No. 4 same farm 100 bbls., while in the Owensboro Field, No. 2 Bartley farm, No. 1 Simpson heirs farm and No. 1 B. D. Spurrier farm are listed at 20 bbls. each.

The Hopewell Pool in Cumberland-Adair Counties is one of the shining lights of Kentucky at this time and bids fair to be one of the large producing pools of the state. This development work is in the Crocus Creek area, but called the Hopewell Pool, being close to the Hopewell Church area. Things have happened of late to show the field's value. Baird & Hickman's No. 1 on the Baker farm, completed some time ago, came in at 150 feet below the Pencil Cave formation and started at the rate of 32 bbls. per hour. According to advice from a well known operator in the field, there are on this lease two 250 and four 100-bbl. tanks full of oil from this well, which is now closed down waiting the erection of additional storage. No. 1 Grider farm is making 8 bbls. per hour, with the storage on that lease full. Nos. 1 and 2 Morgan farm are still running 25 and 50 bbls. respectively. The Brockman No. 1 is making 180 bbls.; No. 2, 144 bbls. and No. 4, 100 bbls. No. 1 Elliott farm was shot with 20 quarts and will make a 50-bbl. initial producer. No. 2 Elliott, 250 feet east of No. 1, is drilling, while Baird & Hickman are drilling No. 1 Grider to the deep pay found in the Baker farm well Wood, Haislett, McLennon and Calhoun are drilling No. 5 G. W. Brockman farm.

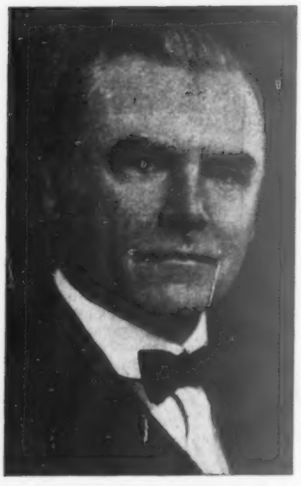
The Hopewell or Crocus Creek Pool is to have an outlet for its crude within a short time as private capital is laying a 14-mile line from Hopewell Church, one-eighth of a mile south of the Adair County line, to connect with the Paragon Development Co.'s line north of Burkesville. This will be a new 2-inch line. Three cars of pipe have been delivered in Columbia, Adair County, from the railroad at Campbellville. The right of way has been secured and two crews are laying the line. This line will follow the Columbia-Burksville Road from about 2 miles north of Burksville, Cumberland County. The heavy rains have slowed down the work of getting this line in, and it looks now that it should be connected by October 15. This is quite an undertaking for that section of the state, more especially for private capital, but the wells ordinarily are large initial producers and those tested so far seem to have staying qualities.

Tennessee

With two recent wells completed on the Mill Creek anticline, near Hilham and Windle, Clay County, Tennessee, it looks as though a wide territory has been opened up for that county, and will no doubt prove larger and more productive than did the Tinsley's Bottom Field that was opened up a few years ago by the

(Continued on Page 81)

MEN KNOWN IN OILDOM



George Coyle

George Coyle, general superintendent and a member of the board of directors of the Prairie Pipe Line Company, is one of the most widely-known men in petroleum transportation.

Mr. Coyle was born in Olean, N. Y., in 1864. At the age of 18 years, after having served an apprenticeship in oil in the service of Capt. N. V. V. Franchot, in Olean, he entered the service of the United Pipe Line Company, which later was taken over by and made a division of the National Transit Company. He was two years with the United, and then was transferred and at the same time promoted to a position with the Buckeye Pipe Line Company in the Ohio Field. He remained in the old Central West territory until 1903 when he was sent to the Mid-Continent Field in the service of the Prairie Oil & Gas Company's pipeline department. When the Prairie Pipe Line Company was organized as a separate corporation, Mr. Coyle was made general superintendent and placed on the company's directorate.

In the course of his long experience in crude oil transportation, Mr. Coyle familiarized himself with every new angle in the business, and himself initiated many of the reforms and improvements in pipeline work. He has always looked ahead and has always been ready to give full consideration to suggestions of improvements over existing methods and to try out ways and means that looked good in theory, and to adopt them if they worked out in practice.

During his 23 years of supervision in the Mid-Continent Field, the Prairie pipeline has been extended from a local line serving the then insignificant Kansas Field to the world's largest crude oil gathering and transportation system serving 50,000 oil wells in Kansas, Oklahoma, North Central and East Central Texas, or more than half of the oil wells in the divisions above specified. The company is now engaged in building a line from Ringling, Okla., into the great Panhandle fields of Texas, which will be of service to producers in that territory in 1927.

Personally Mr. Coyle is one of the most companionable of men and he counts his friends by thousands. The organization he heads won the esteem and confidence of oil men generally by sparing no pains to give the best of service to producers. Prairie employes are like a great family, working together for the common good, and they could not have a wiser "father" than George Coyle.

* * *

PERSONAL PARAGRAPHS

Ralph J. Bennett, of Petrolia, Ont., left recently to join the Imperial Oil, Ltd., staff at Calgary, Alta.

D. S. Brooks, president of the Root Refineries, Inc., Shreveport, La., is in the East on a business trip.

* * *

Carter Barron, Wichita Falls, Tex., of the Gulf Refining Company, was a recent Shreveport, La., visitor.

* * *

J. Mentor Caldwell, independent operator of Fort Worth, Tex., left last week for California on a month's vacation.

* * *

C. J. Francke has returned from Colombia, after approximately two years' service with the Andian National Corporation.

* * *

Sidney Powers, chief geologist of the Amerada Petroleum Corporation, Tulsa, Okla., was a Fort Worth, Tex., visitor last week.

* * *

William Kuss, of Houston, Tex., has been transferred to the production department of the Mexican-Gulf Oil Company at Tampico, Mexico.

* * *

R. W. Howe, general manager of the Atlantic Oil Producing Company, in the Louisiana-Arkansas district, has returned from Pittsburgh, Pa.

* * *

F. J. Miller, geologist for The Texas Company in the Louisiana-Arkansas territory, has returned from a brief business trip to Kansas City, Mo.

* * *

J. K. Kerr, vice president of the Ohio Oil Company and in charge of the Louisiana-Arkansas division, is spending a few weeks in Shreveport, La.

* * *

H. R. Merry, of Merry Brothers & Perini, independent operators in the Cisco, Tex., district, has returned from a month's vacation spent in California.

* * *

Harry McCormick and J. Foster, of Foster and McCormick Petroleum Company, Chicago, Ill., were in Shreveport, La., recently on a several days' business trip.

* * *

Phil K. French and E. T. Merry, independent operators of Cisco, Tex., were in Fort Worth, Tex., last week, having just returned from a trip to Canada.

* * *

W. H. Washburn was recently married to Mrs. Mozelle Tye of Shreveport, La. Mr. Washburn is a scout for the Roxana Petroleum Corporation in the Louisiana-Arkansas division.

* * *

H. M. B. Inglis, who has spent six years with the Eugene Coste interests in Alberta, Oklahoma, Texas and Arkansas, has opened an office at Calgary, as a petroleum technologist.

* * *

Jack Loman, well-known operator of Cleveland, Ohio, stopped over to shake hands with Toledo, Ohio, friends, en route to the Owensboro Field of Kentucky, where he has producing properties.

* * *

H. M. Storey, vice president of the Standard Oil Company of California, traveled down to Los Angeles from San Francisco recently on the company's tanker H. M. Storey, disembarking at Catalina for a short visit.

* * *

E. P. Philbrick, formerly geologist with the Continental Oil Company, has resigned to accept a similar position with the White Eagle Oil & Refining Company, and will make his headquarters at Fort Worth, Tex.

* * *

J. M. Wiles, who operates in the Bowling Green Field, of Warren County, Kentucky, has been spending some time in the Owensboro Field, same State, looking over conditions and incidentally securing some acreage for development.

* * *

George Foster, secretary-treasurer of the Devonian Oil Company of Tulsa, Okla., has returned to Tulsa last week from a trip to Abilene and San Angelo, Tex., in the interest of his company. The Devonian's operations in Texas are carried on by the Hurley Oil Company, which recently took over three-fourths interest in the Gibson & Johnson block, just northeast of the Phillips Petroleum Company's discovery well in Jones County, near Abilene. Mr. Foster plans to establish district offices at Abilene.

D. F. McIntosh, who for 18 years was connected with the Gulf allied companies in the Gulf Coast region, is now with the Sinclair Oil & Gas Company in the land department, Houston, Tex., offices. Mr. McIntosh is thoroughly familiar with Coastal Texas and Louisiana.

* * *

L. H. Freedman, of the geological and land department of the Marland Oil Company, with Houston, Tex., headquarters, has resigned to become associated with the Goodman Drilling Company, Dallas, Tex., headquarters. The company was organized to wildcat in the north Texas territory.

* * *

Gillette Hill and G. H. Collingwood, of the Pullmack Oil Company, Tulsa, Okla., Waite Phillips' new company, were Fort Worth, Tex., visitors one day last week, and rented offices in the F. & M. Building. Mr. Collingwood will return to Fort Worth shortly and assume charge of the new district office.

* * *

T. A. Morgan, of Kansas City, in charge of the land and pipeline departments for the White Eagle Oil & Refining Company, and H. L. Hummel, chief geologist of the company, accompanied Guy W. Mosley, in charge of the White Eagle company's Fort Worth, Tex., office, on a trip through Jones County, Texas, and the adjoining district last week.

* * *

William C. McDuffie, who has left Los Angeles, Calif., for New York, on a business trip, has resigned as vice president of the Shell Company of California, owing to the fact that his entire time is taken up as general manager of production for the parent company, which in this instance is the Royal Dutch-Shell Company. Mr. McDuffie will, however remain as a director of the Shell Company of California.

* * *

Arthur Mandell, with the Hope Engineering Company in the Panhandle section, was a recent Houston, Tex., visitor. Mr. Mandell was formerly in charge of production for the Sinclair Oil & Gas Company in the Gulf Coast and was summoned to Houston in connection with litigation involving a lease at Damon Mound. He is a native of Titusville, Pa., who has been successful as an executive in the Southwest fields.

* * *

R. R. Rakestraw, vice president of the Western Oil & Refining Company, has returned to Los Angeles, Calif., from an eight months' visit to Europe where he went for the purpose of establishing a distributing agency for the company's products. While abroad, Mr. Rakestraw organized the Western Refining & Marketing Company, which will distribute the major portion of the parent company's products in the British Isles.

* * *

George H. Speary has returned to Houston, Tex., to make his home. He has combined a lot of experiences in various branches of the oil industry, although a comparatively young man. He came down from Marietta, Ohio, as a pipeline official and helped build The Texas Company's trunk line from Oklahoma south to the Gulf and was a superintendent for several years. When the El Dorado boom opened, Mr. Speary turned to contracting and producing, operating at El Dorado and Smackover. He was very successful in both lines.

* * *

R. J. Ward, British oil man, has completed a tour of the American and Canadian oil fields and has returned to England. Mr. Ward was production manager for the Burmah Oil Company and was with the petroleum department of the Egyptian Government for some time. He commented on the rapid strides being made in drilling methods, especially in California and the Gulf Coast districts, remarking on the electric drive and long stroke pumping.

* * *

John R. Suman, vice president and general manager of the Rio Bravo Oil Company, has returned to Houston, Tex., from a vacation spent with his family in west Texas. The Rio Bravo Oil Company is a subsidiary of the Southern Pacific Railroad, organized in the early days of the Coastal region to develop and furnish fuel oil for the railroad. Mr. Suman has occupied his present position for about one year and the company now has more production than ever in its history.

Quicker Dressing with Less Labor

Better Dressing with Less Time

Bergquist Steam Derrick Hammer

THIS Hammer eliminates all the hard physical exertion of Driller and Tool Dresser. It will perform efficiently in a standard Cable Tool Derrick or in an outside forge house. No trouble or delay is experienced in dressing Bits, under 18″, in one heat.

On 18″ to 24″ Bits, the time required is less than one half the ram method. In first heat Bit can be spread and shaped properly. Second heat, Dress out to gauge, Hammer down wearing surfaces, Trim out water courses.

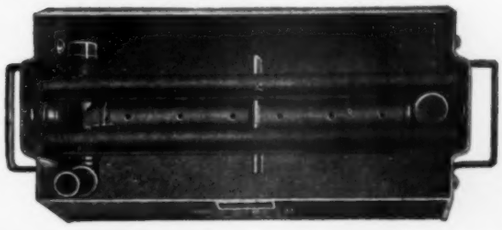
Eliminates hazard of tight hole, as crew will not avoid nor delay dressing a Bit when needed.

With the Bergquist Hammer, Bit steel is drawn and worked out quicker and more uniformly than is possible with a ram or sledge. The steel is worked with less danger of starting checks or of folding or overlapping.

The Hammer will strike over 300 blows per minute, with power enough to work the steel to any desired position. Is a great labor and time saver for the contractor. This means more drilling time.

A special constructed anvil is furnished with each Hammer.

L and G Improved Slack Tub



THE L and G Improved Slack Tub is made especially for cooling and tempering large size Cable Tool Drilling Bits.

It is of sufficient size to hold a large amount of water and will accommodate $5\frac{3}{16}$ inch to 24 inch bits.

It is equipped with a circulating system that carries the cool water direct to the cutting edge of the bit.

The design of this tub is such that it cannot be upset.

All inside parts are removable, permitting the tub to be cleaned.

It is fitted with overflow connections to regulate depth of water. The depth of water should vary according to size of bit.

Manufactured Specially at Our Tulsa Plant

Inquire at Any of Our 100 Branches

OIL WELL SUPPLY CO.

NEW YORK—LOS ANGELES—PITTSBURGH, U.S.A.—SAN FRANCISCO—TAMPICO—LONDON

WORLD'S OLDEST AND LARGEST MANUFACTURERS OF OIL FIELD EQUIPMENT

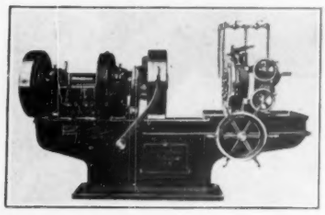
EQUIPMENT AND SUPPLIES

NEW MACHINE ADDED TO THE LANDIS LINE

The Landis Machine Co., Waynesboro, Pa., has added to its new line of pipe-threading and cutting-off machines a 4-inch size. This machine is used by jobbers of pipe and plumbing supplies, by contracting firms, in oil fields, railroad shops and, in fact, wherever pipe is threaded and cut.

The 4-inch Landis pipe-threading and cutting-off machine has a base of different design from the other sizes. The new outline of bed offers an ample support for the headstock and carriage.

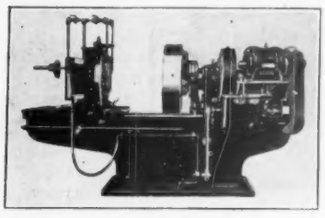
The machine has a gear box and a single pulley drive. It is readily converted to motor drive. All gears are cut from steel and run in an oil bath. A reversing mechanism is contained in the



Front View.

gear box and is operated by a lever located conveniently for the operator. This reversing mechanism eliminates the necessity of crossing the belt or throwing a switch when the machine is to be reversed.

The front and rear chucks are of sturdy construction and are of the three-jaw type. The front chuck has universal



Rear View.

adjustment. It is also lever operated, thereby permitting pipe to be put in and taken out of the machine without stopping the machine. This facilitates production. The rear chuck has independent adjustment. The main spindle of the machine is supported by two distinct bearings, which are lubricated by flat link chains running in an oil reservoir.

The carriage supports the cross rail, on which is located the die heads, the centering jaws, the cutting-off tools and the reaming tool. Two cutting-off tools are employed and are located diametrically opposite each other in holders which have a universal movement to and from the center. These holders also have a horizontal adjustment for the centering of the tools. The reaming device is attached to the cutting-off tool slide and is lever operated.

The range of the machine is from 1 to 4 inches. This range is covered by two Landis stationary pipe die heads, namely a 2-inch head for a range from 1 to 2 inches and a 4-inch head for a range from 2½ to 4 inches. The die heads float horizontally in a T-slide on the cross rail.

All starting, stopping and reversing levers are located on the operating side of the machine within convenient reach of the operator. The levers for obtaining the various speeds within the range of the machine are also located on the operating side of the machine.

The machine has eight speeds. The travel of the carriage is 24 inches. The floor space required is 4 feet 5¼ inches by 8 feet 6⅞ inches. The net weight of the belt-driven machine is 5,700 pounds, while that of the motor-driven machine is 6,300 pounds.

This machine employs the Landis long life tangential chaser.

BOTTLE CATALOG

The Illinois Glass Co. has mailed out general catalog B. This catalog covers in the fullest possible manner the products made by the company. The book is beautifully bound and illustrated, and gives detailed information about bottles of every size, kind and description.

GASOLINE LINE AND PUMP

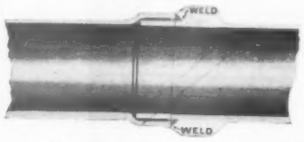
The Byron Jackson Pump Co. is installing a special centrifugal electric pump for the Shell Co. at Brea to pump gasoline to the Shell's gasoline plant at Signal Hill. This pump, of about 650 pounds pressure, is very small and of unique design. There is 140,000 feet of 3 inch line, or approximately 28 miles.

MR. CAMPBELL GOES TO TULSA

John A. Campbell, who has been representing the Butler Manufacturing Co. in the Arkansas and northern Louisiana territory, has been transferred to the Tulsa territory. Mr. Campbell's headquarters will be at Tulsa, Okla.

NEW WELDED PIPE JOINT

The Allen welded pipe joint here shown is designed to reduce the cost of laying pipelines, reinforce the weld and provide deflection or angle, sufficient to take care of expansion and construction, also to conform to the irregularity of the surface



over which it is laid. This joint is also said to prevent any of the filter rod or welding material entering the bore of the pipe which is common with butt welds. This feature makes possible the use of welded lines for oil. The pipe is belled at one end to receive the straight end of the other, which saves considerable time in aligning pipe to weld. Several major companies in California have laid lines using this joint and are said to recommend it above any other type of pipe. Allen, Blaumer & O'Dell, Tulsa, Okla., are the licensees.

LARGE SHIPMENT OF SUPPLIES

NEW YORK, Oct. 2.—The steamer Agamemnon sailed recently with over 2,500 lengths of line pipe, approximately 250 lengths of drilling stem and a large quantity of miscellaneous oil well equipment, destined for Pladjoe in the Dutch East Indies.

A REAL LONG-STROKE

The Midway Iron Works, Taft, Calif., has made the first commercial installation of the Coleston long-stroke pump, at No. 11 well of the Murvale Oil Co. on Thirty-Six Hill, Midway district. This all-metal equipment has a 10-foot stroke and lifts a lot of fluid with little friction. The stroke can be made as much longer as the four upright pipe frames are extended. Superintendent Coleston of the Belridge Oil Co. is using the first equipment of this design and lifting 300 bbls. of fluid daily from a depth of 4,000 feet, North Belridge Pool, powered with an electric motor.

TRADE LITERATURE RECEIVED

The Northwestern Manufacturing Co., of Milwaukee, Wis., has issued folders on the Hansen Arc Welder.

The current number of Oxy-Acetylene Tips, the house organ of the Linde Air Products Co., contains a story entitled "Suggestions for the Pipeline Contractor." This story is very interesting, and contains several suggestions for troublesome problems.

The American Electric Motors, Inc., of Milwaukee, Wis., has sent out folders describing the American ball bearing enclosed, self ventilated polyphase induction motor.

This is reported to be a new motor which is totally enclosed, so that a spark or burn-out will not cause a fire if operated in a spot where inflammable vapors are present. If this claim be true, the motor should find a wide application in refining work and gasoline plant work, where the fire hazard is of prime consideration.

The Goulds Pumps, Inc., of Seneca Falls, N. Y., has printed a report by Robert L. Daugherty, A. B. M. E., entitled "A further investigation of the performance of centrifugal pumps when pumping oils." It is ably written, and illustrated with several curves showing capacity and efficiency of the pumps.

The Borden Co. of Warren, Ohio, has distributed folders detailing the new features of their product, Beaver adjustable die stocks. In the new type, the cam is placed underneath the dies, and by this arrangement all obstruction above and around the threading dies is eliminated, and the full width of the dies above the body is exposed for the free application of oil. As the life of threading dies depends largely upon proper lubricating, this is an important improvement.

The Farley Machine Works of Arkansas City, Kans., has prepared booklets on the Farley long stroke pumping equipment. The booklets are well illustrated and explained in detail the advantages of this equipment.

M. & K. Pump & Specialty Co., of Wichita Falls, Tex., has sent out folders on their products, M. & K. Pumps, traveling valves and sand and gas traps.

National Transit Pump & Machine Co., of Oil City, Pa., has prepared bulletin No. 410 on their new direct connected opposed type gas engine and gas compressor.

This outfit was designed especially for compressing natural gas for transmission either through pipelines, or for gasoline extraction process.

A notable feature of the design is that with the exception of the main frames and camshafts, all parts that are usually made right and left hand on a twin engine have been made interchangeable so that they may be used on either side of the engine.

E. H. LANCASTER DIES

HOUSTON, Tex., Oct. 2.—Ewing H. Lancaster, 53, manager of the oil field department of the United States Rubber Co., is dead at his home here.

ELECTRIC FLOW METER OPERATING ON AN ENTIRELY NEW PRINCIPLE

By Thomas R. Harrison
Director of Research, The Brown Instrument Co.

Electrical operation is especially advantageous for flow meters, affording means of producing external indications and records of conditions existing inside of a high-pressure steam or water pipe, without transmission of mechanical motion—as for instance, by means of a rotating shaft, passing through a pressure-tight packing gland, which would cause serious friction losses.

The new Brown electrically operated flow meter deserves the attention of engineers interested in flow measurement, since by a novel utilization of a well-known electrical principle, the design of the Brown electric flow meter avoids all electrical as well as mechanical difficulties previously encountered.

The readings are fundamentally independent of the value of the voltage impressed upon the electrical system. The instrument reads correctly, while operating on varying line voltages without the use of either voltage regulators or compensators.

The electrical circuits at the manometer, indicator and recorder consist simply of stationary, divided, inductance coils. These have only three connections, permanently made at installation. There are no make-and-break contacts, such as contacts dipping into mercury within the pressure chamber, voltage regulator contacts or similar devices.

In the manometer, or meter body, all electrical windings and connections are entirely external to the pressure chamber.

The integrator is a mechanical device

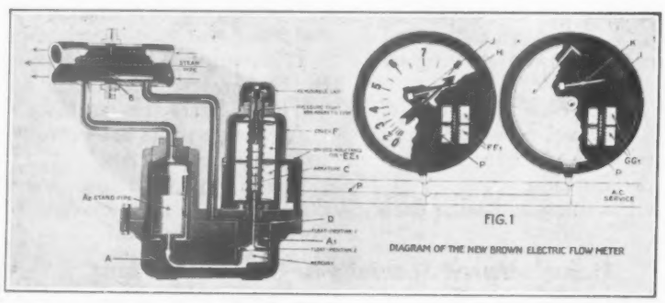


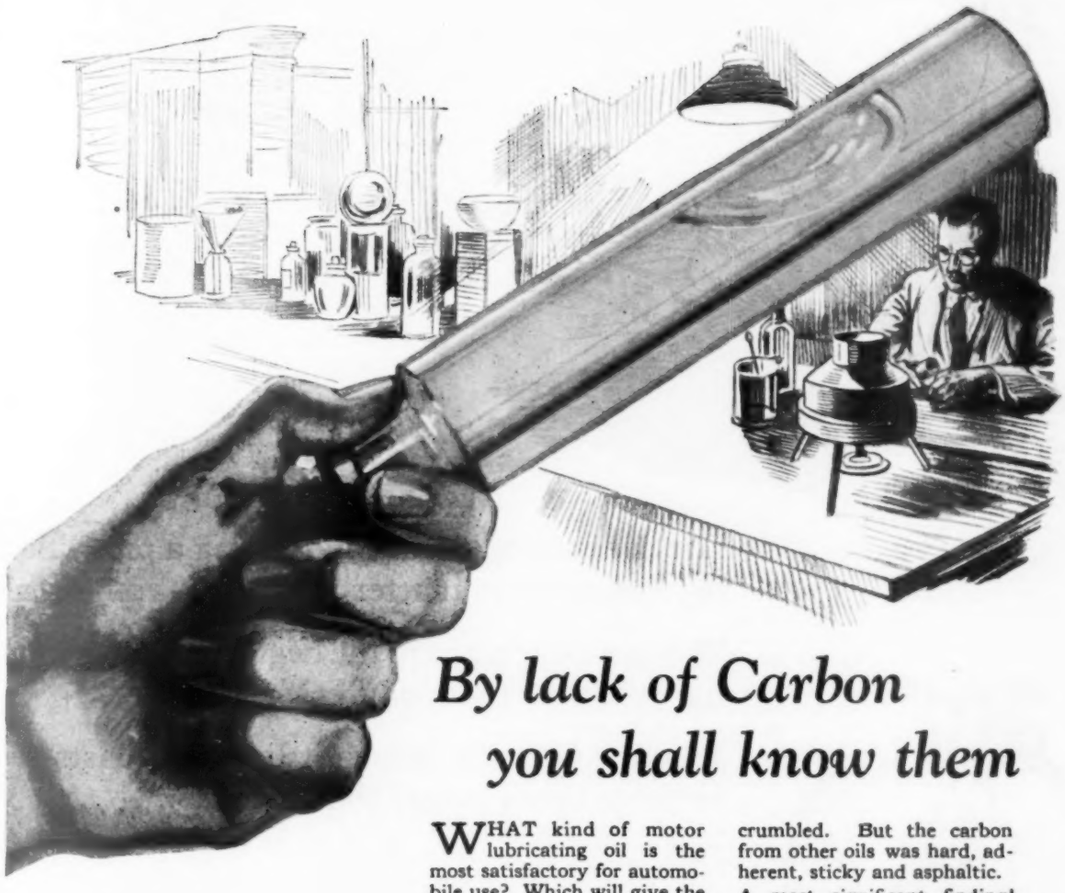
FIG. 1

DIAGRAM OF THE NEW BROWN ELECTRIC FLOW METER

operated by the electric clock which drives the charts. An equal amount of power is available for operating the integrator at all rates of flow, making possible the use of the most easily-read type of 5-figure counter.

A pen operated by the action of the integrator mechanism makes a record at the outer edge of the chart each time the integrator mechanism increases the counter reading by one unit. Each tenth mark is distinguishable from the intermediate marks in order to facilitate count-

(Continued on Page 370)



By lack of Carbon you shall know them

WHAT kind of motor lubricating oil is the most satisfactory for automobile use? Which will give the least trouble from carbon?

Let the facts, not popular beliefs, guide you.

According to a recent investigation, it was found that the carbon deposited on the piston and cylinder head of a gasoline engine was half as much for a Gulf Coastal oil as it was for oils of other origin. And more—the coastal carbon was dry, powdery and easily crumbled. But the carbon from other oils was hard, adherent, sticky and asphaltic.

A most significant finding! Confirming our own tests and those of many others!

To the far-sighted jobber and critical consumer, it can mean but one thing. For minimum trouble from carbon, nothing can compare with coastal oils.

But remember, among coastal oils, CROWN Pales and Reds are the standards of excellence! Specifications, samples and prices on request.

A KINDLY REMINDER!

Crown Oils are all the products of the same *special* crude. All of one uniformly high quality. Their lubricating properties are exceptional—as this advertisement and others to follow will show. Be sure to read each one as it appears.

General Sales Office: Post-Dispatch Building, Houston, Texas

Branch Sales Office
17 Battery Place, New York, N. Y.

Refinery and Terminal
Houston, Texas

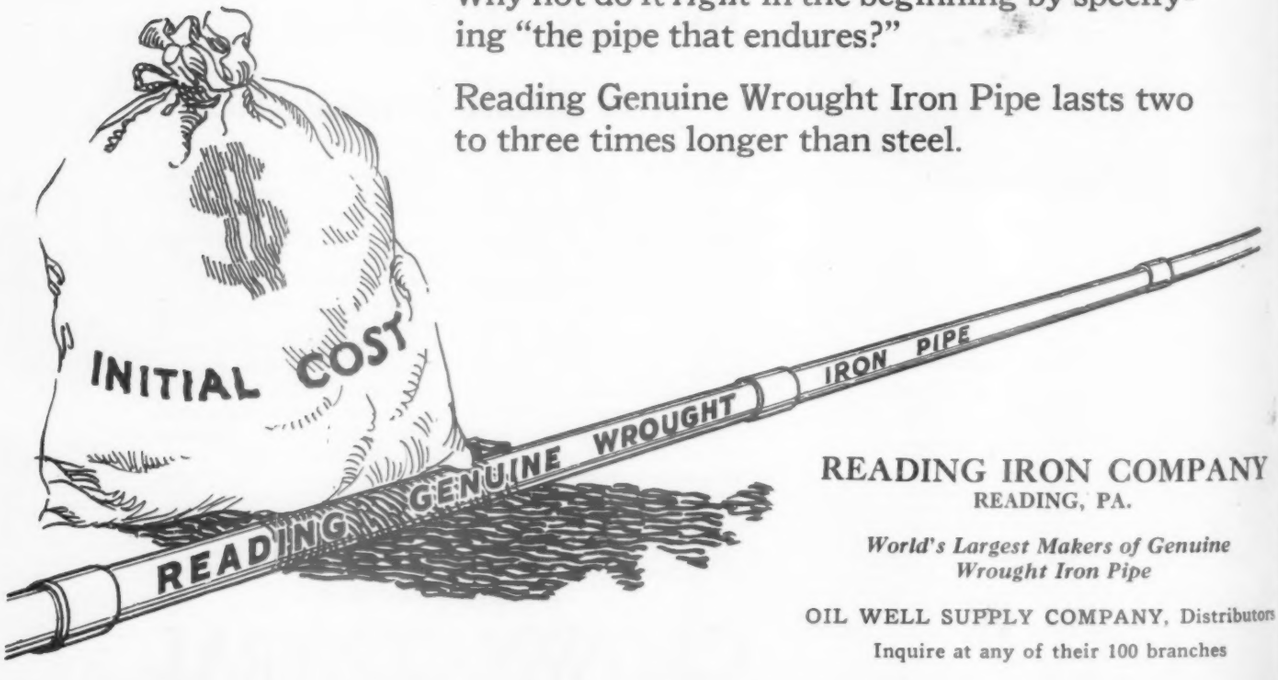
Cable Address: Crowncen, Houston

CROWN CENTRAL
PETROLEUM CORPORATION
New York-Houston

The expense of buying and laying a pipe line is big enough—no matter what pipe you install.

Why not do it *right* in the beginning by specifying "the pipe that endures?"

Reading Genuine Wrought Iron Pipe lasts two to three times longer than steel.



READING IRON COMPANY
READING, PA.

World's Largest Makers of Genuine Wrought Iron Pipe

OIL WELL SUPPLY COMPANY, Distributors
Inquire at any of their 100 branches

READING PIPE
GENUINE WROUGHT IRON

Natural Gas Developments

PRESIDENT'S ADDRESS TO CANADIAN GAS MEN

By C. E. Steele*
President, Natural Gas and Petroleum Association of Canada

When our first annual convention was held at Hamilton, in September, 1919, we had only begun to realize that the natural gas industry was entering the most crucial period in its history. We were then passing from the time of flush fields and unlimited production to a period of reduced supply. These facts alone, however, would simply have required the companies to apply themselves to the physical conditions, which would have meant a rearrangement of business methods and the application of engineering and mechanical principles. The large question which loomed up, however, was the new relation which had to be created between the public and ourselves. Consumers, in the western fields particularly, were just beginning to experience a shortage of supply, and to realize the material decrease in production. Following the application of the consumers to the Government for redress, the Government (wisely or unwisely) was led to undertake a limited control of the industry. Step by step the Government advanced legislation which included the fixing of gas rates.

During the past five years the gas companies have been carrying on under great difficulties. The gas rates have been increased, but not in comparison with the gradually depleting gas fields. Our energies, however, have been particularly directed toward an earnest endeavor to maintain, satisfactory and friendly business relations with our customers. The companies have not been blameless in the earlier days of the gas industry, but while that is true the exceedingly low rates which prevailed gave to the citizens within the gas area a supply of incomparable fuel, at ridiculously low prices. The saving to the public was in the aggregate a large amount, and the use of natural gas has not only meant a great saving to the public, in dollars, but has meant a luxury and convenience the value of which would be hard to estimate.

Since it has become necessary for the gas rates to be advanced, and in some cases very materially advanced, it is, I presume, natural that the consumer should oppose these increases. It should be said, however, to the credit of the consumers generally, that they evinced an attitude of fairness and a desire to face with the company the changing conditions. There were those, however, who were not inclined to be friendly, but expressed distrust and unbelief in every fact stated and condition explained by the companies. Sometimes the opposition was but a spark, but became a blaze when fanned by some for political or mercenary purposes. Gradually, however, and generally, a reasonable and friendly attitude has been shown by our consumers, until today we are sincere in saying that we believe that as fair and friendly relations now exist between the consumers and the companies operating in southern Ontario as may be found in any field on the continent. This merit has always been encouraged by our association, and let us hope that during the years remaining in which it will be possible for the gas companies to operate, that this friendly relation may continue, and to this object our association should lend itself at all times during its continued existence.

*Address at Eighth Annual Convention, Niagara Falls, Ontario.

OHIO MEETING POSTPONED

The convention of the Ohio Gas & Oil Men's Association has been postponed until midwinter, date to be selected later.

TEXAS GAS LINE EXTENSIONS

SHREVEPORT, La., Oct. 2.—The Commercial Natural Gas Co. recently completed a 4-inch lateral into Kilgore, Tex., which tied into the gas company's main line running from Waskom gas field to Tyler, Tex. The lateral was 14,000 feet in length. The main line is an 8 and 10-inch line supplying Marshall, Longview and Tyler with gas, running through each town. Laterals run into Jonesville, Scottville, Hallsville and Kilgore. The main line is 69 miles in length and can handle 10,000,000 feet of gas daily. The gas company's production comes from the wells of its producing company, the Tylong Oil & Gas Co., which operates in the Waskom field. A short lateral was recently completed into Center, Tex., from the Magnolia company's 18-inch line from Shangaloo, La., to Beaumont, Tex.

MAY INCREASE RATES FOR GAS IN HOUSTON

HOUSTON, Tex., Oct. 2.—Houston's public service department is expecting the Houston Gas & Fuel Co. in a few months to ask for an increase in natural gas rates.

Records kept by the department up to date show that the receipts of the company are only about 40 per cent of what they were when the company delivered artificial gas. The cost of operation has probably been greatly reduced by use of natural gas, but after it pays for the natural product it is not believed the decrease in cost of operation will be enough to offset the big decrease in gross income. The company has also made a substantial investment since natural gas arrived.

C. J. Kirk says the approaching winter months will tell the tale. If the consumption climbs high on account of the people using larger quantities of the natural product than they did of the artificial it may solve the problem. Mr. Kirk says the amount of gas used in the city is steadily climbing, but hasn't even begun to make up for the big decrease in gross income brought about by the decrease in rates when natural gas was turned into the mains. While there was an actual decrease, another big decrease in gas bills was due to the fact that the natural product contains more heat value than the artificial.

TURNER VALLEY GAS PROJECT

CHATHAM, Ont., Oct. 2.—C. E. Roth and associates are reported planning to build a pipeline from the Turner Valley Field to Calgary, Alta., to supply natural gas for industrial and semi-industrial purposes in competition with the Canadian Western Natural Gas Co. It was stated that a tentative order for pipe for a 29 to 30-mile line had been placed by the Roth interests. Plans are also being considered for a carbon black plant to utilize the waste gas from the Turner Valley Field.

KANSAS INVESTIGATES INDUSTRIAL GAS RATE

WICHITA, Kans., Oct. 2.—Investigation of industrial gas rates was opened at the city hall by the Kansas Public Service Commission. One question is whether the Wichison Industrial Gas Co. should be required to adjust its rates upward to equal those made for the Wichita Gas Co. by the commission several months ago. Another is whether the Wichison company can abrogate the three and five-year contracts it has with its customers fixing a definite rate for that term; whether an order by the commission revising that rate would be binding in view of these contracts.

The average rate of the Wichison Industrial Gas Co. for industrial users in Wichita is 18.7 cents a thousand feet; for the Wichita Gas Co., under the new order of the commission, slightly over 19 cents. The Wichison has a rate of 22 cents for the first 2,000,000 feet; 17½ cents for the next 28,000,000 feet; and 15 cents for all over 30,000,00 feet. The minimum allowed under the Wichita Gas Co rate (which is in protest by that company, is 18 cents a thousand.

R. B. Newbern, secretary of the Wichison company, testified that his company pays to the Larutan Pipeline Co. 16 cents at Wellington and Wichita, and 17 cents at Hutchison, for the gas which it distributes to industrial consumers. Mr. Newbern expressed the opinion that most of his company's customers would pay more, if necessary, for gas in view of the increased price of fuel oil, and that most of them, for that matter, feel that the price of gas is apt to rise.

Other companies named in the hearing are the Larutan Fuel Co., the Rice County Natural Gas Co., the American Pipeline Co., the Kansas Natural Gas Co., the Kansas-Oklahoma Gas Co., the Wellington Gas Co., the Arkansas Valley Gas Co. and the Winfield Natural Gas Co.

FOR ELECTRIC POWER FROM PANHANDLE GAS

AMARILLO, Tex., Oct. 2.—Electric power from the enormous gas supply, serviced to the farmers at 2 cents a kilowatt and used for power irrigation pumping, was predicted for the Panhandle by C. Berg, Detroit engineer, visiting here.

Berg and associates state they are planning erection of a giant super power electric plant in the gas field, to supply power to farms and cities all over the southwest.

"With the erection of the power plant, we expect to be able to sell power to farmers and others for about 2 cents a kilowatt," Berg said.

"There is an enormous water supply in shallow sands underlying vast stretches of the Panhandle, and with cheap electric power it will be possible to pump this water from wells and irrigate a vast stretch of the plains."

Thousands of farmers can be placed on small 20 and 30-acre irrigated farms in the Panhandle, Berg said. There is virtually no waste land in the entire region and the great majority of the section is highly fertile, he pointed out.

ROCKY MOUNTAIN NATURAL GAS LINES

Location—	Length	Size	Owners
Lost Soldier to Casper	88	10–12–14	Producers & Refiners
Eight Mile Lake to Parco	15	8	Producers & Refiners
Rawlins to Parco	12	8	Producers & Refiners
Sand Draw to Riverton and Lander	48	6	Producers & Refiners
Baxter Basin to Rock Springs	22	6	Producers & Refiners
Elk Basin to Billings	68	8–10	Gallatin Gas Co.
Byron to Powell	12.4	4	Rocky Mt. Gas Co.
Lost Soldier to Rawlins	28.3	4–6	Rocky Mt. Gas Co.
Hidden Dome to Greybull	34.7	8–14	Wyo. Nat. Gas Co.
Sand Draw to Casper	75	10–12	New York Oil Co.
Casper to Glenrock	28	10	New York Oil Co.
Teapot to Casper	36.6	6	New York Oil Co.
Hoone Dome to Poison Spider	15.6	6	New York Oil Co.
Golden Eagle-Grass Creek to Thermopolis	37	4–6	Thermop. Gas Co.
Fort Collins to Cheyenne	28	6	Cities Service

Besides the above lines, a small gas line of 2-inch pipe carries gas from some of the Sunburst Field wells to the town of Kevin and a short system of gathering lines carries gas from some shallow wells in what is known as the Glendive gas field in eastern Montana, to Baker.

USE GAS IN CONCRETE TO CUT BUILDING COST

Gas as a composite of concrete is the latest use. Stockholm has used it in the construction of its post office, dwellings have been constructed of it, a railroad station has just been completed and a large hotel in London has been faced with it. The stone-like facing of walls in a greenhouse of considerable size was cast in a vast slab at the job site and cut up into small units as required much as a carpenter might cut small pieces from a long piece of timber. Blocks and slabs are cut to desired sizes by means of steel wires after the mass has taken its initial set. One of the buildings at the Sesquicentennial Exposition at Philadelphia has been built of this material.

By the introduction of a gas within the mass, consisting of cement and aggregates of any kind or texture commonly used in producing concrete, chemical reactions take place similar to that of yeast in the making of bread. This occurs before the initial set, by which time the concrete has taken on a cellular characteristic, wherein K. P. Billner, of A. B. Vallevikens Cement-fabrik, Sweden, sees possibilities of greatly reducing American building costs.

Concrete made under this process gives bulk and at the same time lightness of weight, thus making it possible to cut down the quantity of supporting steel. The cells are unlike those in common brick, because each void constitutes a closed cell and consequently there is no capillary or moisture absorbing action. Consequently it is water proof and sound proof. It also has insulating qualities, making unnecessary insulation in buildings of whatever size or height.

The weight of normal concrete, in trying to work out a way for casting complete walls of concrete and tying them together to form a dwelling, has been such as to check its popularity as a cost-cutting building process. The cost of the equipment necessary to handle it has offset other savings. In Sweden, it has developed that the lightness of the gas-formed concrete has made possible the expectation of saving in this kind of construction.

NATURAL GAS EARNINGS

CHATHAM, Ont., Oct. 2.—Northwestern Utilities, Ltd., of Edmonton, Alta., which supplies the city with natural gas from the Viking Field, reports a gain of over 6 per cent in net earnings for seven months of the company's fiscal year. An increase of 20 per cent in customers is also reported.

ARKANSAS NATURAL GAS

PITTSBURGH, Pa., Oct. 2.—Interests who control Arkansas Natural Gas Co. have bought privately, from a prominent estate, 162,829 shares of the stock. Price paid is not known, but it is understood to have been higher than prevailing market quotations.

GAS COMPANIES ASK PERMITS

The Oklahoma Corporation Commission is hearing revocable permit applications of gas companies serving eight cities and towns in northeastern Oklahoma. The companies have filed notices with city authorities that they will surrender their franchises and take out revocable permits. All these companies are Doherty properties. Towns affected by the application are Beggs, Chelsea, Nowata, Delaware, Dewey, Miami, Welch and Blue Jacket.

Made of Structural Steel

WHY?

The long arm of a balanced crane safely handles loads of 50 tons or more. Think of the stresses imposed when the load has such enormous leverage. It's safe, for with the Structural Steel construction its designers have accurately computed the loads on every beam, girt and member.

International "IDECO" uses Structural Steel (galvanized) for its derricks. Due to their known strength and careful designing "IDECO" derricks are the "Standard of Comparison."

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(GALVANIZED)

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Amarillo

Tulsa
Wewok[a]
Mexia
Panhand[le]

[Re]port
[Ch]over
[Ot]tawa
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National [Co]mpany o[f]

[Re]presentati[ves]

Columbus, Ohio
San Francisco, Cal[if.]
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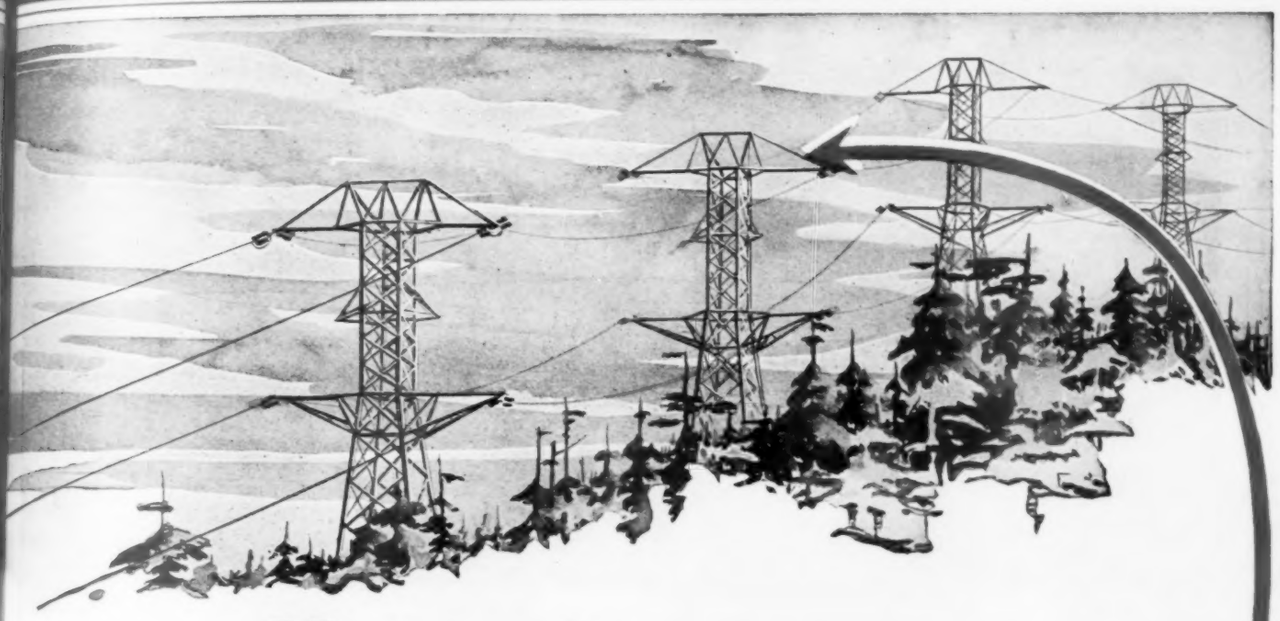
Angele[s]

The largest company devoted exclusively to [the] manufacture of [oil field] equipment for [the] production and [transportation] of petroleum



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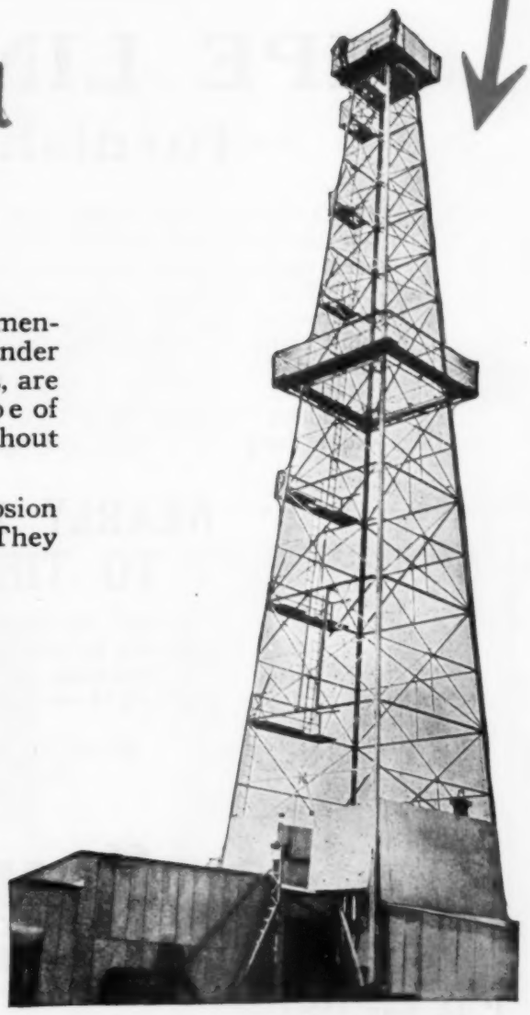
High Tension Transmission Towers carrying their tremendous loads of highly charged heavy wire *must* stand up under every condition. They, too, like "IDECO" Steel Derricks, are built of first-grade Galvanized Structural Steel. This type of construction is the *only* practical one and is in use throughout the world for all permanent load carrying towers.

Eliminate forever losses due to Wind, Fire, Rust or Corrosion and the danger of derrick failures by using "IDECOS." They are the Standard of Comparison.



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(GALVANIZED)

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TO "United" has turned many pipe line companies for the erection of steel storage and station tanks on their pipe lines. In doing this, they assured themselves that the tankage would be built right—and would be ready when needed.

Standard "United" Gas-Tight Steel Roof Tanks were used and equipped throughout with "United" Gas-Tight Fittings.

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"United" has been working hand in hand with the Oil Industry for nearly 25 years. During this period "United" Oil Producing and Refining Equipment has always been built right—and given complete satisfaction to users.

Quotations on your Producing and Refining Equipment needs will be cheerfully furnished upon request.

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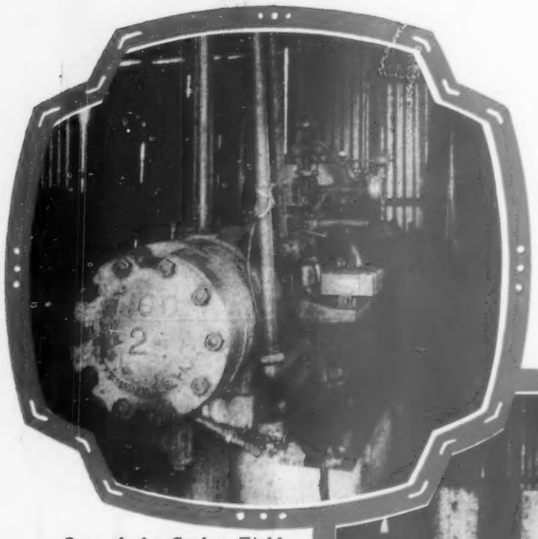
Superintendent, The Buckeye Pipe Line Co.

S. P. DILDINE
Director, The Buckeye Pipe Line Co.

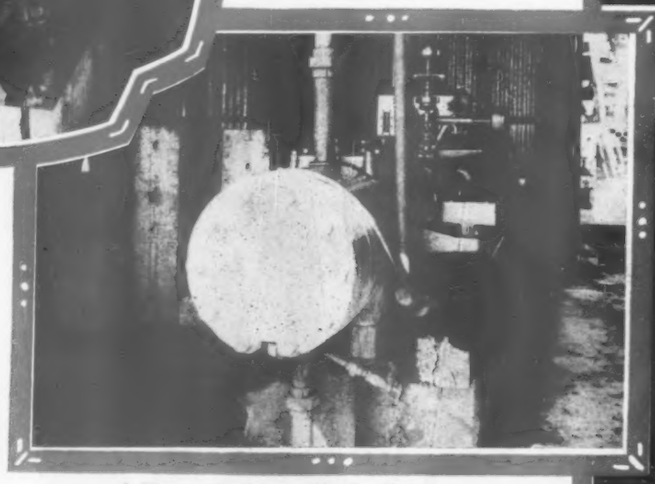
A. J. McCLATCHEY
Director, New York Transit Co.

The Garber Field of th

100%



One of the Garber Field Ticos used for drilling and swabbing.



A Tico on the famous Hartley No. 27 —that came in sometime ago flowing 25,000 barrels a day.

A Tico on the Farm lease of Sinc & Gas Compa

The Sinclair Oil and Gas Co. is "TICO-ED"

SEVENTY-FIVE Tico Gas Engines are in operation in the Garber Field on the Hartley, North Walker and Kisner Farm Leases—all of which are owned by the Sinclair Oil & Gas Company, and are 100% "Tico" equipped.

When prominent producers like Sinclair and similar companies place such implicit confidence in Tico Gas Engines—there's a reason. Any Continental man can tell you why.

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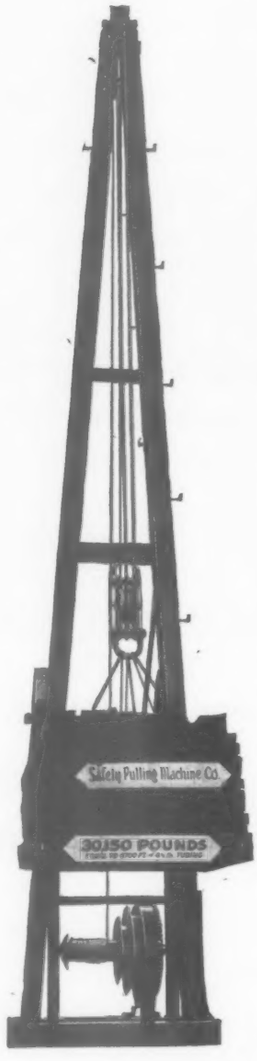
requests from this and other foreign countries emphasizes the dependability of the

Eclipse Deepwell Pulling Machine



Specifications Deepwell

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Mast 8x10x36 ft., Douglass Fir A-Style Two Wheel Truck, two 16" Bronze bearing crown pulleys, 2½ Steel Pin mounted in malleable boxings. Large supporting plate 16" dia. between crown pulleys, eliminating any chance of bending pin.

Reel or Drum; 32 lb. 8¼ casing filled with concrete for winding drum, differentials banded with 3/16 band iron, brake surface 6"x40", choke brake style same as Star drilling machine.

The whole reel assembly is mounted on 2¾ square steel shaft extending clear through reel, secured by three heavy castings.

For sale by all Supply Companies

Manufactured by

SAFETY PULLING MACHINE COMPANY
INDEPENDENCE, KANSAS

EASTERN FIELDS

(Continued from Page 63)

on the Henry Harkins farm. It is a light pumper.

Medina County

In Lot 4, Section 16, Chatham Township, Medina County, the Ohio Fuel Supply Co. completed better than an average well for this district when it drilled in a second test on the L. A. Severpool farm and got a 25-bbl. producer. In Lot 4, Section 14, same township, E. R. Edson, Son & Co. have completed No. 26 on the Carl G. Packard farm and is a very light pumper.

At Bolin Mills, Section 31, Knox Township, Vinton County, Beeghley & Shaffer have drilled a second test on the William Dearth farm into the second Berea grit. Nothing was found at the lower level, and only a light show of oil in the first. They will fill up to the first Berea grit and give it a test. In the northwest quarter of Section 21, York Township, Morgan County, the Pure Oil Co. has completed and shot in the Berea grit No. 7 on the W. F. Williams farm. It is not good for more than 2 bbls. a day.

Monroe County

In the northeast quarter of Section 9, Perry Township, Monroe County, William McClure has completed in the Keener sand a test on the C. S. Buchannan farm. It is a very light pumper. In Lot 1217, Sutton Township, Meigs County, the Pure Oil Co. has started to drill No. 6 on the Yost heirs' farm. In the northeast quarter of Section 1, Wayne Township, Monroe County, Cline & Co. completed in the second Cow Run sand a second test on the A. M. Suittor farm, good for less than 2 bbls. a day. The Pure Oil Co. has started to drill No. 5 on the Jacob Ashcraft, Sr., farm, Section 4, Jackson Township, Muskingum County.

West Virginia's Week-End

The West Virginia fields had very few completions at the close of the week of development work. In Henry district, Clay County, the South Penn Oil Co. completed No. 34 on the O. D. Stockly farm, estimated to be good for 5 bbls. a day in the Big Injun sand.

In Freeman's Creek district, Lewis County, the Philadelphia Gas Co. has drilled its test on the C. D. Brannon farm through all sands, and dry and abandoned. In Paw Paw district, Marion County, the Hope Natural Gas Co.'s test on the Enoch Amos farm is a gasser in the Gantz sand. In Mannington district, the Carnegie Natural Gas Co.'s test on the S. C. Thorn farm is a fair gasser in the fifth sand.

Two miles southwest of the Stump Oil Co.'s test on the Looney farm, in Geary district, Roane County, the Elkins Oil & Gas Co. has completed in the salt sand a test on the Fred Smith farm. It is a gasser good for 1,000,000 feet. On Wolf Run, Union district, Pleasants County, L. C. White has completed a test on the Gardner heirs' farm. It is a very light pumper.

Gasser in Kanawha County

On Buff Lick Run, Big Sandy district, Kanawha County, the United Fuel Gas Co. has completed a test on the Etta Wherle farm and is a fair gasser in the Big Injun sand. On Kings Creek, Butler district, Hancock County, F. L. Freshwater's No. 5 on the W. W. Herren farm is good for 5 bbls. a day in the Berea grit.

Duster in Ritchie County

In Union district, Ritchie County, the Auburn Oil Co. has completed in the Big Injun sand a second test on the Lawson Hull farm. It is a duster. In Southwest district, Doddridge County, the Pittsburgh & West Virginia Gas Co. has completed in the Big Injun sand a second test on the E. L. Leggett farm. It is a gasser good for 1,000,000 feet. In Liberty district, Marshall County, the Manufacturers Light & Heat Co. has a gasser in the Gordon sand at a test on the A. L. Evans farm. In Union district, W. F. Burgess & Co. drilled No. 1 on the Michael Marrison farm through the lower sands, and dry. In Clay district, Wetzel County, the Carnegie Natural Gas Co.'s No. 5 on the Margaret Abrigg farm is good for 5 bbls. a day in the Gordon sand.

Test Wells Starting

In Walton district, Roane County, the Bufflick Oil & Gas Co. has started to drill on the Taylor heirs' farm. In Smithfield district, Godfrey L. Cabot has a rig completed on the Keffer heirs' farm. The United Fuel Gas Co. is the most active in development work in this county. In Smithfield, Walton and Geary districts it has 15 wells drilling, 4 rigs up and locations for 17 wells.

In Ten Mile district, Harrison County, the Hope Natural Gas Co. has started to drill on the S. C. Stonestreet farm. In Liberty district, Marshall County, Guy Patterson is due in the Gordon sand at a second test on he Alfred Howard heirs' farm. In Meade district, the Decem Development Co. has shut down at 2,117 feet on the Frank Baker farm. In Church district, Wetzel County, the Carnegie Natural Gas Co. is rigging up at a second test on the John Hostattler farm. In Clay district, the Manufacturers Light & Heat Co. has shut down at 2,300 feet on the Esther E. Fox farm. In Liberty district, Marshall County, the same company is rigging up on the S. H. and M. Ernest farm.

In Central district, Doddridge County, the Pittsburgh & West Virginia Gas Co. is rigging up on the S. M. Duckworth farm. In Union district, Ritchie County, the same company is rigging up on the Lewis Garrison farm. In Skin Creek district, Lewis County, the Hope Natural Gas Co. is building a rig on the Charles Clark farm. In Church district, Wetzel County, the Pittsburgh & West Virginia Gas Co. is due in the sand at No. 3 on the A. J. Bartrug farm, and hauling tools to a location for No. 4, same farm. In Credo district, Wayne County, the Jeffrey-DeWitt Insurance Co. is down 2,835 feet at a wildcat on its own property.

Wood County Tests

In Walker district, Wood County, Forrest Cline is rigging up at a test on the J. W. Goodwin farm. In the same district, the Four D. Oil Co. has a rig up on the Elbert Blewer 6 acres. In Union district, Parsons & Sweeney are skidding the rig at No. 12 on the C. G. Ralston farm. In the same district, the Penn Royal Oil Co. is rigging up on the Hebrick-Rapp farm. In Murphy district, Ritchie County, the Hope Natural Gas Co. is building a rig on the C. A. Stanley farm.

In Battelle district, Monongalia County, the Pittsburgh & West Virginia Gas Co. has started to drill a test on the Daniel Tennant farm. In the same district, the Manufacturers Light & Heat Co. has started to drill a second test on the J. P. Kennedy farm.

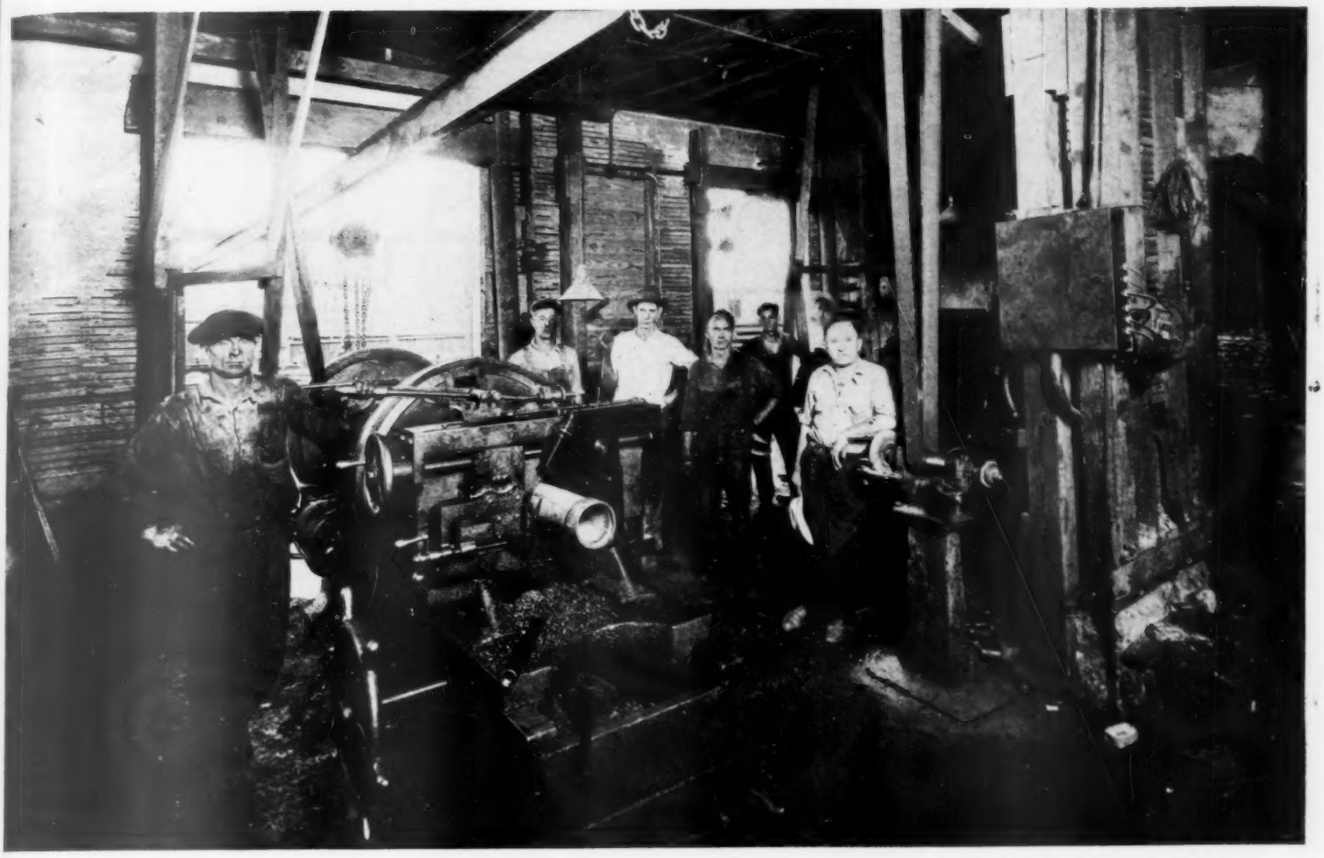
In Center district, Gilmer County, the Carnegie Natural Gas Co. is rigging up on the Hennon McCartney farm and hauling rig material to a location on the J. T. Moss farm. In Lee district, Calhoun County, Godfrey L. Cabot is rigging up on the C. A. Jarvis farm.

In Elk district, Harrison County, the Grasselli Chemical Co. has drilled its test on the Emma B. Walker farm through the Benson sand to a total depth of 4,425 feet. It is a light gasser. In Union district, same county, the Reserve Gas Co.'s test on the Henrietta Ward farm is a gasser in the same formation. In Coal district, the Washington Gas Co. has shut down at 2,374 feet at a test on the E. D. Fittro farm.

Southwest Pennsylvania

It has been sometime since the southwest Pennsylvania fields presented a good producer. One of the best in many months has just been completed on the Adam Weir farm, located 2 miles east of Prosperity, in Morris Township, Washington County. The first 24 hours after the well was drilled into the fifth sand it produced 100 bbls. The well is owned by Dunn & Co., and it is their No. 5 on this farm. The well is in defined territory and its size considerable of a surprise.

In Perry Township, Greene County, the Peoples Natural Gas completed a test on the Ensley Lemley farm, and is a fair gasser in the Big Injun sand. In the



A No. 12 Duplex Improved B & K Pipe Machine in action. Capacity up to 12½-inch pipe or casing.

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WHEN you buy a pipe machine you really buy millions of feet of pipe threads. The problem then is to choose the machine which will produce perfect threads faster and at the lowest possible cost.

B & K Pipe Threading and Cutting Off Machines represent half a century of specialized development. They are the product of a thorough knowledge of the needs of oil producers for power machines for properly, speedily and economically preparing pipe for installation.

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It is the inner fabric of the belting that must bear the constant belt strain, which is especially severe in oil field service. Inner plies of ROUGH RIDER belting have proven by tests to be 35% stronger than ordinary belt fabric. This extra strength will reduce to a minimum shut-downs due to stretching.

Inner plies are bonded together by long-lived rubber friction, and are powerfully lockstitched to prevent "bootlegging."

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CONTINENTAL

same township, the Carnegie Natural Gas Co.'s second test on the Morgan Wade farm is good for 8 bbls. a day in the same formation.

South of Bristoria Station, Richhill Township, Greene County, S. McCracken and others have completed their test on the S. C. Chess farm. It is a gasser good for 750,000 feet. In Springhill Township, the Dunn Mar Oil & Gas Co.'s No. 3 on the Rachel E. Berfine farm is a gasser in the Gordon sand.

In Wayne Township, Greene County, the Philadelphia Gas Co. has completed in the fifth sand a gasser on the Catherine Lapping farm. In Gilmore Township, the Fish Creek Oil & Gas Co. has a gasser in the Big Injun sand at a test on the Arthur Main farm.

In Dunkard Township, the Federated Oil & Gas Co. has completed in the Gordon sand a test on the O. Henderson farm. It is dry and abandoned. In the same township, George Vance has completed in the Big Injun sand a test on the R. Miller farm. It is also dry and abandoned. In Greene Township, Jesse L. Garard completed No. 5 on his own farm. It is good for 5 bbls. a day in the Dunkard sand at a total depth of 650 feet.

In Gilmore Township, Green County, the Dunkard Valley Oil & Gas Co.'s test on the Harry Lemmon farm is a gasser in the Gordon sand. In Springhill Township, the Dunmar Oil & Gas Co. has a gasser in the same formation on the Rachel King farm. In the same township, the Pierson Oil & Gas Co. drilled down No. 3 on the W. M. Pierson farm, and is a gasser in the Gordon sand.

In Whitely Township, Greene County, the Carnegie Natural Gas Co. has completed in all sands a test on the Lantz heirs' farm. It is dry in all sands. It has been abandoned. In the same township, the Philadelphia Co. drilled a test on the J. H. Williamson farm through the fifth sand. It is a fair gasser. In Canton Township, Washington County, E. E. Robertson has completed a test on the E. K. Lewis farm, good for about 5 bbls. a day.

Samuel Rex and others have drilled a test on the Mrs. R. J. Tuttle farm, in Ohio Township, Beaver County, through the sand, and not good for more than 2 bbls. a day.

KENTUCKY-TENNESSEE

(Continued from Page 65)

Dafoe interests. These two wells showed initial production of around 500 bbls. each and since the report was made by this publication some few months ago much leasing has been done at advanced prices on the Mill Creek structure. A pipeline already runs across this structure and the production will be taken care of. The Stoll Oil & Refining Co., of Louisville, owns the line which runs from the Tinsley Bottom Field to Windle, Tenn. The two wells already are a mile apart and it looks like an extensive field may be developed. This pipeline system also passes over another prospective development known as the Crawford Mill anticline. This structure lies within a couple of miles of the railroad. One feature of the Crawford Mill anticline is that land owners are anxious for it to be developed and will do all they can to have some test work done. Reports are that Senator Matthews offers to give a lease on 1,000 acres and to pay one-half interest in putting down a test near his home town of Windle, Rural Route 6, Livingstone, Tenn. To reach the proper depth in this area, geologists state it will require a hole 800 or so feet to strike the same pay sand found in the Mill Creek structure and from 1,700 to 1,900 to find the pay found on the Monroe anticline. Some 25 years ago a well was drilled on the Crawford Mill anticline to a depth of 300 feet, where a pocket of oil was found.

The extension of the Paragon Development Co.'s line from Cumberland County to the Celina Field or to the Clark Pool, in Clay County, Tennessee, is rapidly nearing completion and will give an outlet for a large production now accumulated in the Clark Pool, which is in storage awaiting the line's completion. This is a 9-mile extension of the line to the south, and will give that part of Clay County its first outlet for crude.

Week's Work Summarized

A summary of the week's work in the Kentucky Field shows 21 completions, 15 producers, with an initial production of 372 bbls., 5 dry holes and 1 gas well. Compared with the previous week, there were 11 less completions, 10 less producers, 101 bbls. more new production, 2 less dry holes and 1 more gas well. The wells were distributed by counties and districts as follows:

County—	Comp.	Oil Wells	Prod.	Dry	Gas
Owensboro district..	6	5	76	1	0
Estill	4	3	25	1	0
Lawrence-Johnson...	3	3	20	0	0
Cumberland-Monroe..	2	2	244	0	0
Lee-Owsley	1	1	5	0	0
Wayne	1	1	2	0	0
Floyd-Knott	1	0	0	0	1
Johnson-Magoffin ...	1	0	0	1	0
Warren	1	0	0	1	0
Allen	1	0	0	1	0
Total	21	15	372	5	1
Last week	32	25	271	7	0
Difference	11	10	101	2	1

Eastern Division

Few completions are reported from any section of the eastern Kentucky division, but an improvement is looked for during the coming 30 days, as operators will scramble to bring in and connect to power plants as many new wells as possible. The recent completions near Ivyton, along the dividing line of Magoffin and Floyd Counties, have brought about an active leasing campaign, as at least three wells are 2 miles or better from the Ivyton Pool. Hupp, Duff and Chiles and the Ivyton Oil Co., owners of the wells, are getting busy in the drilling of additional wells.

Farther to the south of the Ivyton area there is also considerable interest being shown in advance operations in deeper pay sands territory. In McCreary County, at a location midway between Williamsburg and Pine Knot, on the McCreary side of the line, Asher and others are nearing the pay sand in the first of six tests to determine whether extensions of the Beaver sand may be made to the east of Wayne County. This area is not far removed from the Tennessee line. In Knox County, to the east, the Petroleum Exploration Co. started drilling on a first of a series of tests on the north Jellico acreage, on the Indian Creek Dome. Recently there has been a flurry in lease-taking through Clay and Knox Counties, the greater part of several thousand acres acquired being in upper Knox and lower Clay Counties. One of the largest gas producing companies is said to be behind this extensive leasing.

In the Irvine Field of Estill County, District 8, four new completions are reported. The Superior Oil Corp.'s No. 22 on the Sim Horn farm, reported at 10 bbls., and its No. 1 Dudley Alexander farm, 5 bbls. Bruner & Adams drilled a dry hole at their initial well on the Thomas Mitchell farm, and came back with a 10-bbl. pumper at their second well on the same lease.

In the North Weir Field of Lawrence-Johnson Counties, three completions were made in District 22, where Garrison & Townsend's No. 5 Foster Ferguson farm showed 6 bbls. and their No. 11 J. N. Sparks farm 4 bbls. The Swiss Oil Corp.'s No. 33 Proctor Sparks farm is showing 10 bbls. initial production.

In the South Weir Field of Johnson-Magoffin Counties, Oliver Jenkins and others reported a dry hole in No. 3 on the H. B. Adams, Sr., farm in District 31.

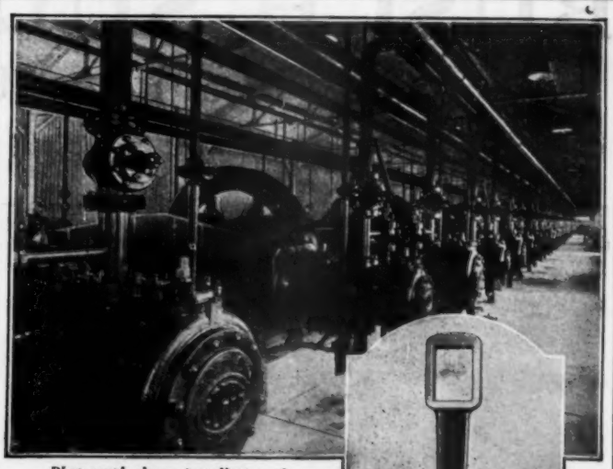
In the Monticello Field of Wayne County, District 5, Davis and others' No. 2 on the Gregory & Ramsey farm, is good for 2 bbls.

In Lee-Owsley Counties, District 35, H. B. Sipple has a 5 bbl. producer in No. 3 on the H. D Parrish farm.

In Floyd-Knott Counties, District 21, the Ivyton Oil & Gas Co. struck a good gas well estimated at 2,000,000 feet at a test on the Felix Allen farm.

Western Division

Outside of the Owensboro Field and the Glasgow Field, little is being found



Photograph shows installation of sixteen cooper type-80 gas engines, all equipped with Champion Drop Forged connecting rods, in plant of Lone Star Gas Company.

They work for the dollars you pay them

LAZY labor doesn't get a permanent place on your payroll. Why should lazy production equipment? Lazy, unproductive equipment costs you just as many dollars in interest charges as full-time, productive machinery.

The only certain method of insuring continuous production from vital production equipment is to make positively sure that the vital load-bearing parts have the sturdy stamina to stand up under the punishment of merciless oil field service.

Drop Forged Parts have load-bearing, strain-resisting ability in a proved and positive degree. They're tough. They're strong. They have the stamina to stand the racket. And for that reason they're the production man's most effective trouble-chasers.

The production engineer who insists on drop forged parts for replacement and who demands drop forgings on all new equipment will reap pleasing dividends in greater production at lower costs.

THE CHAMPION MACHINE & FORGING CO.
Cleveland, Ohio

CHAMPION DROP FORGINGS

BUSCH-SULZER DIESELS

Are Ideal Power Units for Refineries or Pipe Line Pumping Stations

600 B.H.P. Engine in Webster, Tex., Station

400 B.H.P. Engine in the Satsuma, Tex., Station

HUMBLE PIPE LINE CO.

In the Pumping Stations of the Humble and Sinclair Pipe Line Companies there is a total of 89 Busch-Sulzer Engines in successful operation.

SINCLAIR PIPE LINE CO.

Two 500 B.H.P. Engines in Beck, Neb., Station

Two 750 B.H.P. Engines in Humboldt, Kans., Station

BUSCH-SULZER BROS. DIESEL ENGINE CO.

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of interest, the big noise being centered in the Owensboro area, in which several of the large companies have entered and are leasing all available territory. The entrance of the Ohio Oil Co., one of the largest well owners on the Continent, means much for the future of the western division, and the purchase of the Indian Pipe Line Corp.'s extensive pipeline system running from the Scottsville-Bowling Green Fields in the southern part of Kentucky, through Kentucky to Owensboro, thence through southwestern Indiana on to Lawrenceville, Ill., means that the Ohio Oil Co., of which the Illinois Pipe Line Co. is a part, has entered the western division with a view of doing all in its power to develop prospective territory, not alone in western Kentucky, but in southwest rn Indiana as well.

Wildcatting

With the entry of the Petroleum Exploration Co., one of the large producing companies in the Blue Grass State, into the Muhlenberg County oil field, another territory is expected to be developed, to rival that of the Owensboro, Bowling Green, Glasgow and Scottsville sections.

According to reports from Owensboro, a contract was made by the Petroleum Exploration Co. for the drilling of a well in the Penrod neighborhood, in the southeastern part of Muhlenberg County and north of Diamond Springs, the location being between Penrod and the Springs—a section believed to have large possibilities. Geologists for the Petroleum Exploration Co., as well as for two other large companies, have been going over the territory and pronounce it without a fault and expect to get good results. The acreage which the Exploration company signed up is sufficient to induce it to put its drills into the section, it was learned, and it became known also that virutally the entire southern end of Muhlenberg County has been leased by operators.

The opening of oil wells in Muhlenberg, heretofore known as one of the finest coal counties in western Kentucky, will be a big thing to that county, as the greater part of the county is of such surface condition, it is of little value for agricultural purposes.

Under Central City, the geologists who have studied the Muhlenberg situation say, is to be found the best deposits of oil. All of this territory, however, is controlled by the coal operators, who own the acreage for mineral rights and do not want their mines pierced for oil drilling because of fear of natural gas.

The well of the Exploration company, near Penrod, has spudded in and its outcome will be watched with interest. This company has also large wildcat acreage in Daviess and Ohio Counties.

Owensboro Field

Six completions were reported from the Owensboro Field of Hancock, Ohio and Daviess Counties and close to 30 strings of tools are working or shut down as a shortage of water is complained of, something that is not possible for any other part of the country at this time, most sections being flooded by water.

The Penn-Indiana Oil Syndicate's second test, a little in advance of production and on the Simpson heirs 126 acres, between Whitesville and Haynesville, is reported good for 20 bbls. Same company's No. 1 on the B. D. Spurrier 50 acres, about 3 miles west of Haynesville, is also reported showing for 20 bbls. initial production.

The Wood Oil Co.'s No. 2 on the J. U. Bartley 139 acres, 350 feet north of No. 1 same farm, is reported as having a 20-bbl. showing. No. 3 well is drilling.

Ellis & Courson has what looks for a duster at a test on the A. Martin 50 acres, and the failure to find oil was quite a surprise as the location looked an ideal one.

White Plains Oil & Gas Co.'s No. 4 on the John C. Ward 50 acres, is reported showing for 15 bbls. in the Jett sand. No. 7 of this company on the Midkiff, is showing for a well.

The Butte Dredging Co.'s No. 4 on the Alice Evans 104 acres, is not of much value as its production is given at 1 bbl. Reports are the test on the Ira Howard 216 acres was showing dry, but this has not been confirmed.

In the Scottsville Field of Allen County, Mrs. Laura Spencer's test on the Enochs farm was dry at 354 feet.

In the Bowling Green Field of Warren County, C. P. Tannehill drilled a duster in a test on the George Perkins farm at 500 feet.

MEXICO'S NEW RULES LIMIT OIL DRILLING

NEW YORK, Oct. 2.—The Mexican Secretary of Industry and Commerce has announced conditions under which oil companies may drill wells on lands to which they have not fully established their rights. The circular states:

"Permits (to drill) will be provisional and subject to the condition that owners and holders legally prove their rights which will be stated in each case, and which cannot in any manner be extended beyond December 31 of this year.

"In order to obtain this permission companies or persons who are soliciting permits must give a bond of 100,000 pesos in Mexican currency (about $50,000) satisfactory to the secretary for each well they wish to drill on the lands to which they have not fully justified their rights.

"This is to guarantee to the nation the value of the oil which may be extracted from each well drilled in these lands in case the claimant or holder or owner of the permits does not prove his legitimate rights within the time limit mentioned in Article 1.

"In consequence of what is stated in the foregoing articles, if permits are canceled the holder of them is obliged to reintegrate the value of the rights of the nation to the oil that has been extracted, and if he does not comply with this condition the secretary will make the bond effective, using the economic faculty to which the permit holders must agree.

"These permits are authorized with the purpose of not interrupting the oil exploitation and maintaining it in its present condition during the time within which the holders have not proved their legal rights.

"The granting of a permit does not confer any rights in favor of the holder. By using the permits the holders accept absolutely the conditions stated in this circular.

"The agreement issued on June 8, 1926, is hereby derogated."

VOLUME ON OIL

The United States Oil Policy, by John Ise, Professor of Economics in the University of Kansas, is the title of a volume of 547 pages recently published by the Yale University Press. The first 11 of the 30 chapters are devoted to the history of the industry, search for oil and the development of the pools in the different states. There are chapters on the Standard Oil Co., the public lands, Congress and Teapot Dome.

The book contains much interesting matter which has been widely separated and now, brought together in excellent form, should prove convenient to those interested in the history of oil production. The list of references at the end of each chapter is an exceedingly valuable feature.

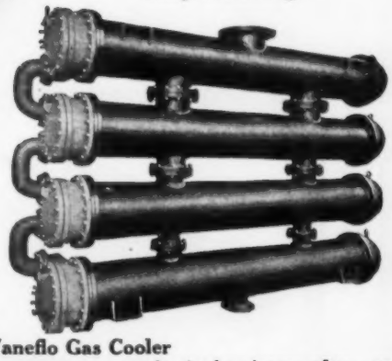
BLAFFER TRIAL OCTOBER 20

AUSTIN, Tex., Oct. 2.—The State's $50,000,000 suit for recovery of title to land in the Humble oil field, against R. L. Blaffer and virtually all large oil producing firms and numerous individuals, will be called for trail in Travis County District Court on October 20. Five days will be given to the argument of the law questions involved before the trial on the evidence starts, according to agreement of counsel and the court, it was announced by Judge J. W. Hawkins, representing the Goldmann intervenors in the suit. The State is claiming title to over 650 acres of land in the field, and accounting on and recovery of the value of oil taken from the field since its discovery.

A complete line of refinery heat-exchange equipment

G-R Bentube Section

prevents scale from accumulating to a thickness that affects heat transmission. Standard interchangeable sections. Provision for expansion, drainage, and easy cleaning.



G-R Sectional Condenser

Can be used either as a standard or reflux condenser. The sectional arrangement permits using as a condenser and heat exchanger in one set or to obtain a different cut from each section.

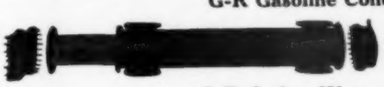
G-R Vaneflo Gas Cooler

can be used as inter-, after-, or pre-cooler. Has low pressure loss and exceptional efficiency.

G-R Twin Heat Exchanger

for efficient interchange of heat between crude oil feed stock and still bottoms, cold water and hot oil, feed stock and hot still vapors, etc.

G-R Gasoline Condenser



Can be used as a knockout box or fractionating control section with particularly close control of the end points.

G-R Jacket Water Cooler

uses any source of raw water to cool the jacket water from oil and gas engines and compressors. The famous Multiwhirl Cooler—thousands in operation in every liquid cooling service.

R-G Mineral Seal Oil Heat Exchangers

A compact, twin exchanger with strict counter-current flow to promote maximum rate of heat interchange.

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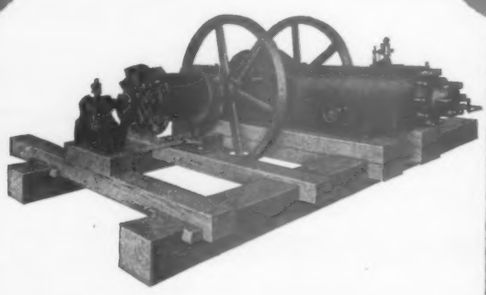
STEAM VS. DRILLING



Franklin Valveless Oil Drilling Engine

For Cable Tool Drilling

A single cylinder oil engine which will give minimum operating cost, better performance under all conditions, and reduce drilling time.

Gives a perfect drilling motion and eliminates "fighting" the engine at any point from top hole to oil. Easy to start in all weathers. Visible lubrication.

Prices

Complete with Self-Oiling Reversible Drilling Clutch, Circulating Pump and Fuel Tank.
Sizes for Mid-Continent and Western Service, $3,350 and $3,700—F. O. B. Factory
Sizes for Eastern Service, $2,600 and $3,350—F. O. B. Factory

What the Steam Engine User Has to Contend With~

1—TONNAGE—Weight of the Steam Engine and its boiler makes its transportation costs very high, from the standpoint of handling and cartage. Moving a steam engine from one well to another is a serious and expensive problem.

2—WATER—Not only the amount and cost of hauling the great quantity of water necessary to operate the steam engine, but the effect of the notoriously poor water available in the oil fields is a big problem the driller must contend with. It is not unusual for boiler tubes to give out after very few days of service due to the deteriorating effect of the water available.

3—FUEL—Wood and coal are hard to get, difficult and expensive to transport. When gas is used, laying of lines alone in many instances is more than the cost to operate a Franklin Valveless Oil Drilling Engine.

4—MAN POWER—A steam engine requires almost constant attention so that its selection adds not only to the costs of transportation, water and fuel, but to the pay roll.

THE WONDER ENGINE FOR DRILLING

FRANKLIN VALVE

THEY BEAT STEAM A

OIL AND GAS ENGINES

What the FRANKLIN VALVELESS Owner has in His Favor

1—LIGHT WEIGHT—A complete Franklin engine can be carried to the job on one truck. Moving from well to well is a simple problem.

2—WATER—Records show that 100 barrels of water are sufficient to drill a thousand feet of hole.

3—FUEL—Whether using the Franklin Valveless Oil Drilling Engine or the Franklin Valveless Gas Drilling Engine, you will find the cost of operation astoundingly less than steam.

4—OPERATION—The Franklin Valveless Engine will do all that a steam engine will and at a fraction of the cost to operate. Unlike many oil or gas engines the Franklin is designed for flexibility and smoothness of operation. It has the power and uses it. No change of fuel conditions in shifting location will bother the Franklin owner because a Franklin Type AO Oil Engine can be converted from oil to gas in two hours time.

Franklin Valveless Engine Co.
FRANKLIN, PA.
Distributed by

Atlas Supply Company
Muskogee, Okla., and Branches

New Martinsville Supply Co.,
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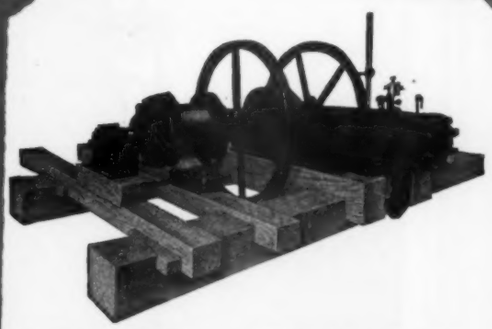


Franklin Valveless Gas Drilling Engine

For Cable Tool Drilling

A drilling engine operated on natural gas which eliminates excessive fuel bills, water supply, moving expense and lubrication and affording a perfect drilling unit with no adjustments necessary during the entire drilling operation. One man can easily start this Franklin.

Prices

Complete with Self-Oiling Reversible Drilling Clutch and Circulating Pump.

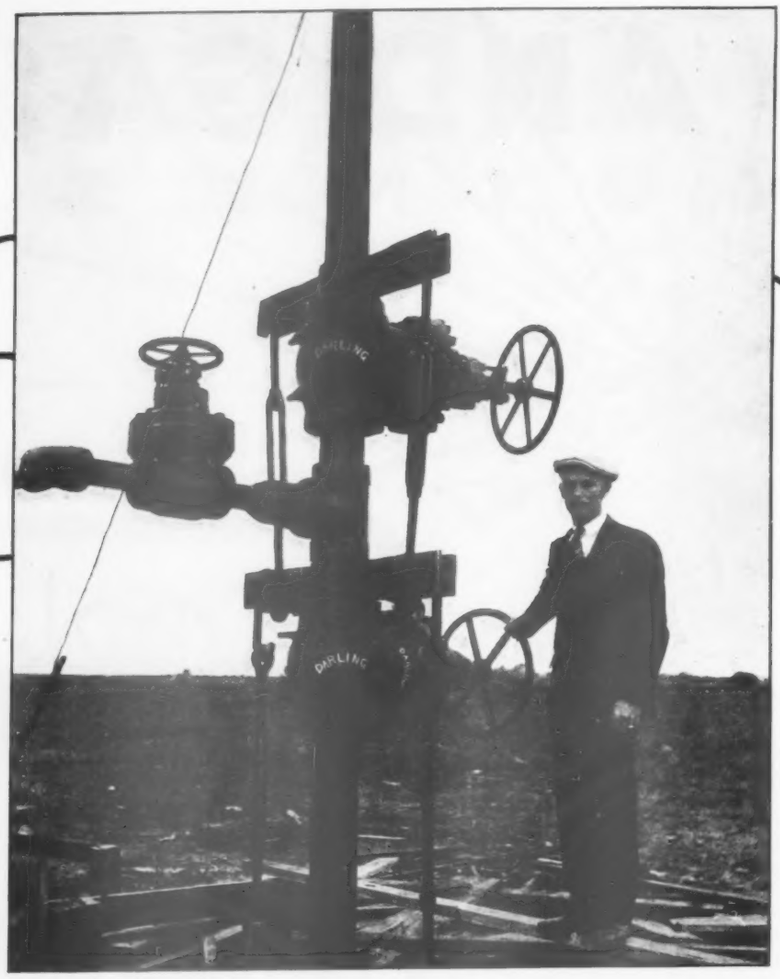
Sizes for Mid-Continent and Western Service
$1,725 and $2,150—F. O. B. Factory

Sizes for Eastern Service
$1,450 and $1,725—F. O. B. Factory

Franklin Engines Will Do Everything Steam Will Do

LESS ENGINES

AT EVERY TURN



1000 pounds pressure under perfect control

After this operator had carefully examined the construction of the new Darling Cast Steel Drilling Valve, and noted the many practical improvements, he decided to put them to a real test in a location where high pressures were expected.

One test was enough to convince him that he had struck the right valve, for his first hole came in at 1000 pounds rock pressure and the Darlings "kept the lid on" tight and the flow under perfect control.

Do you know how and why the Darling Cast Steel Drilling Valve differs from the general run? If not, ask your distributor for the booklet describing this superior drilling valve in detail. You'll appreciate the practical value of its improvements.

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Williamsport, Pa.

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Mid-Continent Distributors

Frick-Reid Supply Co.
International Supply Co.
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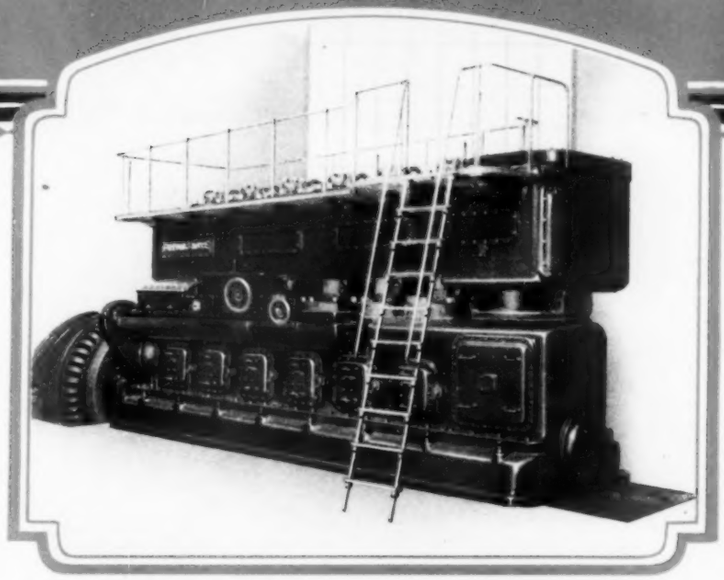
Petroleum Supply Co.

California Distributor

Petroleum Equipment Company, Los Angeles

DARLING
GATE VALVES



Now F-M dependability in larger Diesel units

This engine is the outgrowth of proved principles in Diesel building. To plants with large power requirements it offers a Diesel of unprecedented simplicity—Fairbanks-Morse simplicity. And with this simplicity goes the dependability that has been indelibly written into the operating records of more than a million horsepower of Fairbanks-Morse installations.

Like other F-M Diesels this larger engine is a valveless two-stroke-cycle Diesel with port scavenging, airless fuel injection, and trunk-type pistons. Thus it retains the basic principles that have made Fairbanks-Morse a great name in the Diesel industry.

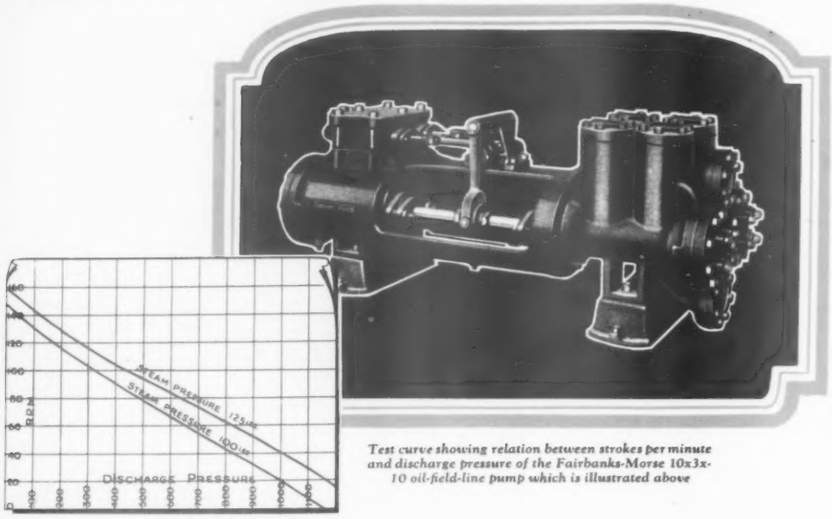
The illustration shows how thoroughly these basic F-M principles have been adapted to the requirements of larger Diesels. Here is compactness coupled with accessibility—simplicity coupled with staunchness.

And one result—the result you would expect in any F-M Diesel—*absolute dependability.*

The larger series of F-M Diesel Engines are built in sizes of 480 - 600 - 720 hp.

FAIRBANKS-MORSE

DIESEL ENGINES · PUMPS · MOTORS



Test curve showing relation between strokes per minute and discharge pressure of the Fairbanks-Morse 10x3x-10 oil-field-line pump which is illustrated above

Here *is* performance

This actual test of a Fairbanks-Morse 10x3x10 oil-field-line pump tells its own story of the adaptability of this unit to field service. When operating at 40 strokes a minute against 800 pounds pressure it is necessary to increase steam pressure only 25 pounds to step the discharge pressure up to 1000 pounds. Ample cushioning effect is provided in the design of the steam end so that in the event of a suddenly "broken" suction line or interrupted suction supply, the mechanism is not racked or damaged by racing. Note that under these conditions the pump operated up to 160 R. P. M., or four times normal speed, with perfect cushioning.

For loading, primary pumping, etc., this self-oiling pump has proved ideal. Every moving part —even the silent chain—is totally enclosed and runs in oil. The pump is furnished either with F-M Ball-Bearing Motor, with F-M Gas Engine, or for belt drive.

Down to the finest detail, this pump is designed and built to meet high-pressure requirements with maximum efficiency and lowest maintenance cost. The design of the fluid end eliminates the possibility of gas-pocket formation, thus insuring a completely filled cylinder every stroke. These pumps are also built in sizes of 10x-3½x10 and 10x4x10, with interchangeable, removable cylinders which can be readily changed or renewed in the field.

Practically every power or pumping requirement found in the oil industry is met by F-M pumps, motors and internal-combustion engines. One of our engineers would like to work with you in meeting your specific requirements.

FAIRBANKS, MORSE & CO., *Chicago*
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A835—A(OP)A02.1

LIMITS AUTHORITY OF INVESTIGATORS

(Continued from Page 34)

ent or received by or furnished to the Millers' National Federation. The original papers and documents required by the commission to be produced in evidence are unquestionably the goods and chattels and therefore the property of the Millers' National Federation or of its component members. The unauthorized taking of them from their possession is therefore not only an invasion of property rights without statutory justification, but what is more to the point a violation of the constitutional right of at least three of the plaintiffs to the security of their papers against seizure and the exposure of their contents to the public without warrant of law.

"Even corporations will be protected against the taking of their books and papers by administrative officers if no such authority is conferred by statute. Under Section 6, the commission or its agents may at all reasonable times examine and copy any documentary evidence of any corporation under investigation or proceeded against. Neither section, however, confers on the commission the power to direct the removal of books, papers, or documents from the place of business of the corporation, for the purpose of an administrative investigation.

Injunction Justified

"True enough, the plaintiffs may refuse to testify or to produce the minutes and letters required by the commission, and test the right of the commission to issue the subpoenas when it is sought to punish them for contempt, as provided in Section 9, or when they are charged under Section 10 with a criminal offense punishable by fine, or imprisonment, or by both fine and imprisonment, as therein provided. But plaintiffs are not obliged to wait for a criminal or other prosecution where Government agencies, under color of authority, but without sanction of law, threaten to deprive them temporarily or permanently of their constitutional rights.

"Courts, it is true, will not issue injunctions against administrative officers on the mere apprehension that they will not do their duty or will not proceed according to law, but administrative officers must keep within the statute in the exercise of their powers and if they threaten or seek to do something which is wholly beyond their jurisdiction they will be restrained. Where an administrative agency seeks, attempts or threatens to do something beyond its jurisdiction which will constitute an invasion of property or constitutional rights and threatens to commence criminal proceedings to compel obedience to its mandates, it may be enjoined from commencing such criminal proceedings. If the commission may be enjoined from bringing criminal proceedings under Section 10 of the Federal Trade Commission Act, it can hardly be argued that it can not be enjoined from exceeding its jurisdiction and doing the things which would constitute the basis for such criminal proceedings.

"In addition to all that, it appears from the bill that if the letters, papers and documents are produced to the commission, they will be revealed to the public at the time and place designated by the defendant in its subpoenas and will be transmitted to the Senate of the United States where they will be published and made available for inspection by every one as a public record. Such a publication or revelation constitutes an intrusion on the privacy of business and an infringement of constitutional rights for which the law affords no adequate remedy and from that it follows that the intervention of equity is justified."

CANADIAN FIELDS

(Continued from Page 46)

on account of the shoe of some old casing, which was sidetracked, projecting at this point, making it necessary to run the 6-inch further down. The test is now waiting for the cement to set.

British Dominion's No. 1, LSD 4, Section 5-20-2w5, is at 2,700 feet and drilling open hole for the 10-inch, after setting the 12½-inch casing at 2,600 feet. New McDougall Segur, LSD 14, Section 12-20-3w5, is drilling below 2,290 feet in the green shales of the Dakota formation, with further small gas showings.

Calmont Oils, Ltd., LSD 2, Section 1-20-3w5, is at 2,210 feet and running 12½-inch casing to the bottom of the hole. The Dakota formation was entered at 1,960 feet, two shows of gas being struck in the top of the Dakota. The log corresponds closely with that of the McLeod No. 2, about three-quarters of a mile north. Tom Giffin and Louis Keim are looking after the drilling.

Turner Valley Field

Home Oil Co., whose No. 1 well, LSD 10, Section 20-19-2w5, recently got a fair production of light oil in the Dakota sand, has taken over the holdings of the Advance Oil Co. in the Turner Valley Field, comprising the 40 acres of LSD 14, Section 20-19-2w5, for a cash payment plus a block of Home stock and a one-eighth royalty on any oil obtained from Advance No. 2 in the Dakotas. The Home Oil Co. holdings now include LSD 10, 14 and 15, Section 20-19-2w5, with three wells partly drilled, Home No. 1, LSD 10, at 2,110 feet; Advance No. 4, LSD 14, at 1,820 feet; and Advance No. 1, LSD 14, shut down at 3,160 feet. Home No. 1 got an estimated production of 25 bbls. a day in the Dakotas. Advance No. 2 is drilling close to the same horizon, and will be put on the pump as soon as it gets production. Home No. 1 will be carried down as a deep test of the dolomitic limestone. Nothing will be done with Advance No. 1 at present, but it is planned to finish it later as a diamond drill test. With the Advance leases, the Home Oil Co. took over all the assets on the property, including drilling machinery and buildings. The Federal oil regulations forbids drilling within 200 feet of the borders of any property, and the consolidation will open to drilling approximately 13 acres where the holdings of the two companies touch. It is understood a program of intensive drilling for shallow production in the Dakota sand may be undertaken if Advance No. 2 makes a good showing on the pump.

Cooper-Nanton Oils, LSD 2, Section 7-20-2w5, is at 3,400 feet and drilling open hole for 8¼-inch casing, after overcoming considerable difficulty with cavings first encountered at 2,780 feet. Advance No. 2, LSD 14, Section 20-19-2w5, is setting 12½-inch casing at 1,820 feet preparatory to drilling the well in. Home Oil Co.'s No. 1, LSD 10, Section 20-19-2w5, has resumed drilling at 2,110 feet after setting the 12½-inch casing at that level. New Valley Oil Co., LSD 4, Section 6-21-2w5, is at 1,200 feet and drilling.

Highland Oils, LSD 5, Section 5-20-2w5, has finished setting the 15½-inch casing at 1,550 feet and resumed drilling. New Valley Oil Co., LSD 4, Section 6-21-2w5, which has been shut down waiting for coal, is again drilling at 1,200 feet.

New Black Diamond No. 1, LSD 1, Section 3-20-3w5, is drilling at 1,330 feet, after getting into the Dakota formation at 1,185 feet. The log shows the Benton formation over 800 feet shallower here than in the main part of the Turner Valley Field. The test has been drilling open hole since setting the 20-inch. Some small gas pockets were met in the Benton.

J. W. Hopkins of Los Angeles has leased considerable acreage near the Home and Advance wells, and will put down a test, largely financed by Buffalo capital.

Moose Mountain

In the Moose Mountain Field, Signal Hill No. 2, LSD 9, Section 34-23-5w5, is drilling considerably below 1,000 feet and has got two small shows of gas. Cherokee Oils, Section 33-23-5w5, is reported drilling around 1,900 feet. Reserve Oils, Morley Reserve, is drilling below 1,900 feet. Wabash Oils, Morley Reserve, is reported rigging up.

Drumheller Oils, Ltd., has located No. 1 test in the NW of Section 23-29-20w4, 3 miles north of Drumheller, on a structure mapped by E. R. Sager of Los Angeles. The company was recently organized with head office at Drumheller, Alta., and capitalization 300,000 no par shares. Officers are: President, H. C. McConkey, Drumheller; vice president, H. D. Brown, Hussar; directors, W. G. Nelson, Hussar; W. T. McDaniels, A. E. Sibbald, Arthur Hunter, Nels Gunderson, all of Drumheller; secretary-treasurer, Lars Ormberg, Drumheller.

Horseshoe Oil Co., recently organized with head office at Calgary and 500,000 shares capitalization, has located No. 1 test in LSD 13, Section 16-24-3w5, in the Springbank district about 15 miles west of Calgary. The structure parallels that in the Jumping Pound district on which Imperial-Bow River No. 1 is being drilled. Officers of the company are: President, J. R. Munro; vice president, Robert McLaren; secretary-treasurer, R. J. McLaren; managing director, G. T. Van Wart; director, J. G. Hutchings. No. 1 test is expected to spud in this fall.

In the Aldersyde district, Ranchmen's Oil & Gas Co., LSD 16, Section 13-20-29w4, is reported rigging up.

In the Jumping Pound district, Imperial Oil, Ltd., Bow River No. 1, LSD 15, Section 12-25-5w5, is reported at 3,885 feet and drilling. West of Nanton, Imperial-Rice Creek, Section 4-14-2w5, is drilling at 5,000 feet. In the Border Field, Imperial-Burdett No. 1, Section 8-11-11w4, is drilling at 2,690 feet. East of Coutts, Imperial-Erickson Coulee No. 1, LSD 13, Section 8-1-12w4, is at 2,440 feet and drilling, having finished running 8¼-inch casing to this depth.

Close to Coutts, the Urban Oils, Section 4-1-15w4, is at 3,063 feet and drilling in a very hard limestone. Devenish Petroleums, LSD 5, Section 27-5-24w4, is reported to have run 15½-inch casing to the bottom of the hole, shutting off the artesian flow of 30,000 bbls. a day recently encountered. The water flow was the largest of its kind ever encountered in Canada, being met in the Milk River sandstones at 425 feet.

On Montana Side

On the Montana side, the Julian Petroleum Co. is reported finishing a pipeline from the Kevin-Sunburst Field to Coutts, Alta. This line was commenced by the Rice-Fulton interests with the intention of building a refinery at Coutts. Cope Development Co. No. 2, Section 23-35-2w, which got production at 1,395 feet, is being put on the pump. Wolfe Development Co. is skidding a drilling outfit on Section 27-35-2w, for No. 3 test.

In the Wainwright Field, east central Alberta, Western Consolidated No. 2, Section 30-45-6w4, is being drilled in and at 2,231 feet and will apparently make from 75 to 100 bbls. a day or better. It may develop a flowing well. Emerald Oils, Ltd., LSD 8, Section 30-45-6w4, is at 2,400 feet and drilling. It is being carried down as a test of the lower horizons, after failing to get commercial production in a tight sand at 2,100 feet. Edmonton-Wainwright Oils No. 1, LSD 4, Section 29-45-6w4, is being pumped about 10 hours a day, selling the bulk of its production locally for fuel oil. Production is improving considerably on the pump. The well is reported making 2,000,000 feet a day of gas, which is stated to be a wet gas. Wainwright-Dome Oils, LSD 7, Section 31-45-6w4, has leased a rotary outfit from the National Exploration Co. and will run continuously with 8-hour shifts. British Wainwright No. 2, LSD 13, Section 20-45-6w4, some 80 rods southeast of British Petroleums No. 3-B, is reported rigged up ready to spud in. Interior Oil Co. Section 35-44-7w4, is drilling below 1,500 feet with small shows of both oil and gas. It is reported that California interests have secured control of the British Petroleums, Ltd., and are planning to clean out No. 4 well and deepen both No. 4 and No. 2 to the Madison limestone. Manufacturers Oil & Refineries, Ltd., is planning to put down a test in LSD 15, Section 20-45-6w4. Wes lock-Wainwright Oils, Ltd., has been organized under Alberta charter with $150,000 capitalization and head office at Westlock, Alta., to drill in the Wainwright Field.

Ribstone Field

In the Ribstone Field, Imperial Oil, Ltd., Ribstone No. 1, Section 5-45-1w4, is at 632 feet and drilling. Ribstone Oils, Ltd., is putting down a series of shallow 6-inch holes to determine the structure, before going ahead with its commercial test in this field. Advance Oil Co.'s No. 3, LSD 1, Section 16-45-1w4, is just getting through the surface gravel.

In the Turner Valley Field, Royalite Oil Co.'s No. 5, LSD 13, Section 7-20-2w5, is at 3,527 feet and fishing for the lost bit. Royalite No. 6, LSD 16, Section 31-19-2w5, has recovered the lost fishing spear and resumed drilling at 3,079 feet. In the Highwood Field, Imperial Oil, Ltd., Highwood No. 1, LSD 3, Section 36-18-3w5, which was shut down for repairs to the rig, has resumed drilling at 275 feet.

In Saskatchewan, Unity Oil Co.'s No. 1, SE of Section 23-41-24w3, is at a depth of 1,818 feet and drilling in a very hard formation. It is now running a double shift.

In British Columbia, the British Columbia Oil Co. is preparing to drill in the Crow's Nest district, north of Glacier Park, where the Glacier Oil Co. recently got some oil showings around 3,250 feet depth.

In Ontario, Union Natural Gas Co.'s No. 13, Dawn Township, Lambton County, is reported drilling.

LINES OF PURE OIL PIPE LINE COMPANY

The miles of pipe owned by the pipeline department of the Pure Oil Co. follow:

	2-Inch	3-Inch	4-Inch	5-Inch	6-Inch	Total
Eastern division:						
Ohio	563.21	126.30	114.82	.....	12.98	817.31
Pennsylvania	579.98	133.06	81.01	32.90	233.67	1,120.62
West Virginia	155.51	68.73	24.36	.96	102.54	351.73
Mt. State Gas Co.:						
West Virginia	9.41	4.64	17.19	.....	8.64	39.88
Total eastern line	1,267.75	332.73	237.37	33.86	457.83	2,329.54
Oklahoma division	78.54	54.14	109.72	7.45	28.62	278.47
Total	1,346.29	386.87	347.09	41.31	486.45	2,608.01

Wells Connected to Lines

	Wells
Eastern division:	
Ohio	3,525
West Virginia	799
Pennsylvania	3,893
Oklahoma division:	
Cushing	202
Ardmore	373
Muskogee	537
Mt. State Gas Co. West Va.:	
Cabin Creek	306
Kelly's Creek	82
Bradford Hollow	3
Total wells connected	10,020

Stations— East. division:	Main Line Stat'ns	Gather'g Stat'ns	Field Stat'ns (No tanks)
Ohio	3	26	30
West Virginia	1	11	24
Pennsylvania	9	14	10
Okla. division	3	3	..
Mt. State Gas Co..			
West Va.	..	3	..
Total stations.	16	55	64

Note: This report does not include Cornplanter local gathering line.

ARTESIA, NEW MEXICO

(Continued from Page 50)

feet. A derrick has been erected by this company for its second well on the Danciger permit in Section 21-17-30. Three miles west of this location the Pueblo Oil Co. will drill a well, provided certain permit requirements are adjusted, the location to be in the C SE of Section 26-17-29.

Eddy County

Compton and others' No. 2 Mann permit, Section 3-18-27, shut down at 2,060 feet; Cook-Ironside's No. 1, Section 10-

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20-29, shut down at 2,040 feet; Decem Development Co.'s No. 1 Vandagriff permit, Section 5-17-29, making 1,000,000 feet of gas from 1,300 feet; Empire Oil & Gas Co.'s No. 2, Section 2-18-27, drilling at 300 feet; Flynn-Welch & Yates' No. 3 Dunn permit, Section 10-18-28, drilling at 2,315 feet; No. 10, Section 29-18-28, drilling at 2,300 feet; No. 52, Section 28-18-28, rigging up; No. 53, Section 32-18-28, drilling at 1,400 feet; Hamilton Petroleum Co.'s No. 1 Billings, Section 12-19-26, shut down at 1,100 feet; Hasenfuss-Donley's No. 2, Section 13-18-28, shut down; Henderson-Dexter-Blair's No. 1, Section 9-19-28, shut down at 2,100 feet, repairing derrick; Levers-Carper's No. 4, Section 3-18-28, drilling at 1,800 feet; Merriwether and others' No. 1 Goodale permit, Section 19-18-29, fishing; Navajo Oil Co.'s No. 2, Section 28-17-28, drilling at 1,100 feet; Ohio Oil Co.'s No. 7 Toomie-Allen, Section 28-18-28, drilling at 1,200 feet; Phillips & Welch's No. 1, Section 35-17-28, on production; Phillips & Welch's No. 1, Section 18-18-28, drilling at 1,250 feet; Pueblo Oil Co.'s No. 1, Section 33-17-28, drilling at 2,120 feet, 1,500 feet of oil in the hole; Rehn and others' No. 1 Winans, Section 15-18-26, cleaning out after shot, 300 feet of oil in hole; Swartz-Compton-Eaton's No. 1 Brainard permit, drilling water well; Sun Oil Co.'s No. 1, Section 21-25-30, drilling at 2,150 feet; Skelly Oil Co.'s No. 1 Lynch permit, Section 22-17-31, capped waiting clearance of title; Sullivan's No. 1, Section 1-18-31, to set 8¼-inch casing at 2,465 feet; Wooley-Jones' No. 1 Beeson, Section 33-17-30, drilling at 3,265 feet; Wooley-Jones' No. 1 Danciger, Section 21-17-30, building derrick; Williams Petroleum Co.'s No. 5, Section 17-18-28, drilling at 1,000 feet.

Lea County

Cap Rock Oil & Gas Corp.'s No. 1, Section 11-16-32, drilling with rotary at 300 feet; W. P. Cooper's No. 1, Section 27-19-38, drilling; J. S. Covert's No. 1, Section 15-21-33, shut down at 1,100 feet; San Angelo Exploration Co.'s No. 1, Section 25-19-35, rigging up; Henderson-Dexter-Blair's No. 1 Wyatt permit, Section 34-17-33, setting 12½-inch casing at 675 feet; Ingelfield-Bridges' No. 1, Section 4-17-34, drilling below 1,400 feet; Maljamar Oil & Gas Corp.'s No. 1 state lease, Section 16-17-32, drilling at 450 feet; No. 1 Grace Mitchell permit, Section 5-17-32, drilling at 700 feet; Mescalero Petroleum Co.'s No. 1, Section 27-19-38, drilling; T. P. McDonald's No. 1, Section 22-18-34, shut down; Ohio Oil Co.'s No. 1 William Mitchell permit, Section 18-17-32, drilling at 1,950 feet.

GULF COAST FIELDS

(Continued from Page 53)

The Old Colony Oil Co. has started No. 14 Liberty in the old Dayton Pool.

Harris County Pools

In the Goose Creek Pool the Humble Oil & Refining Co.'s No. 26 Smith, a workover, will make a pumper at 2,875 feet.

Like the Orange Pool, Goose Creek is also showing less and less activity each week and for practically the same reasons. It is another spot that is considered as not being a saline uplift.

On Galliard Peninsula the Humble company is deepening No. 10 and drilling No. 31 at 2,135 feet. No. 32 is a location. On the Smith tract No. 31 is drilling deeper and No. 68 is drilling around 3,500 feet. The Gulf Production Co.'s No. 6 Hirsch is at 4,900 feet. No. 10 State Land is at 3,545 feet and No. 13 Chapman-Bryan is a location. The Gulf Coast Oil Corp. is deepening No. 14 Galliard. The M. & B. Oil Co.'s No. 5 Scorrgea is at 1,980 feet. Keen & Wolf's No. 9 Schilling is around 2,500 feet.

Pierce Junction Pool

The north northwest flank of the Pierce Junction Pool, 8 miles south of Houston, is increasing in activity. J. F. Bashara's No. 2 Bender is still making 1,000 bbls. from 3,800 feet. It was completed last week.

The Humphreys Corp. has entered the pool, drilling No. 1 Leggett at 775 feet. Eunice and others' No. 1 Bullock-Nash is rigging. J. F. Bashara's No. 3 Bender is a location. Casing was set in No. 1 Higgins at 3,525 feet. The Navarro Oil Co.'s No. 1 Humble is showing oil in sand at 3,525 feet. The Rio Bravo Oil Co.'s No. 4 P. F. Settegast is at 3,23[illegible] feet. Locations have been made for Nos. 4 and 5 Settegast. The Gulf Production Co.'s No. 1 Jones fee is drilling below 2,900 feet, and No. 1-A Jones is around 3,235 feet. The Texas Company's No. 1 Dooley is at 3,325 feet. The Gulf Co.'s No. 19 Taylor, on the east flank of the dome, is around 4,000 feet. H. R. Cullen's No. 7 Howe is sidetracking at 3,65[illegible] feet.

Beneduum and Trees' No. 1 Hirsch on the northwest side of the Humble Pool, is drilling below 2,500 feet. Joh[illegible] Deering's No. 4 Bissonett is at 1,90[illegible] feet. The Viviana Petroleum Co. is rigging No. 3 Bender, and Burt & Blaffer No. 35 Dunman.

Nice Well at Boling

The Texas Company's No. 10-A Taylor on the northwest flank of the Boling Dome, Wharton County, came in at 3,4[illegible] feet, flowing 1,000 bbls. initial, 29 gravity oil. It is one location south of No. 6 Taylor.

The Boling Oil Co. is rigging No. 1 Kastienck on the dome, and Gayle & Weed's No. 3 Keller is drilling there for the shallow sand production above the cap rock. On the northeast flank, The Texas Company's No. 1 Farmer is reaming at 4,035 feet. The Sun Oil Co.'s No. 1 Farmer is drilling around 1,900 feet. These two tests are over the line in Fort Bend County.

Fort Bend County Pools

At Blue Ridge, the Humphreys Corp.'s No. 1 West-Schenck, on the south flank of the dome, is drilling around 1,100 feet. The Gulf Co. has a location for No. 1 West-Schenck. On the east side, the Sinclair Oil & Gas Co.'s No. 2 Davidson is at 3,785 feet. The Gulf Production Co.'s No. 9 Luscher is drilling around 2,78[illegible] feet. On the west side, the Texhoma Oil Co. is deepening No. 2 Booth, and the Navarro Oil Co.'s No. 1 Robinson is rigging up to start drilling.

At Big Creek, the Gulf Production Co.'s No. 32 and 33 Davis are drilling.

At Nash Dome, the Rycade Petroleum Corp. is swabbing No. 5 Fessner around 3,400 feet. Nos. 9 Wisdom and 8 and 9 Nash are drilling.

At Orchard Dome, the Gulf company has a derrick for No. 9 Moore. The Rycade corporation and Gulf company have all the likely looking acreage around these two domes, and the other companies are blocked out.

Other Pools

The Texas Company's No. 82 Hogg at West Columbia is drilling around 2,13[illegible] feet, and No. 12 Abrams is at 616 feet. They are on the north side of the pool. On the northeast side, the Hyde Production Co.'s No. 2 Masterson is drilling around 2,675 feet.

The Rycade Petroleum Corp. is rigging No. 3 Kountz on the south side at Markham.

At High Island, the Sun Oil Co.'s No. 8-C Cade is drilling around 4,900 feet, and No. 11 Cade is at 2,785 feet. No. 10 Lockhart is below 1,125 feet.

South Louisiana Pools

In the Vinton Pool, the Gulf Refining Co.'s No. 40 Star is flowing 1,200 bbls. at 3,050 feet. Same company's No. 41 Vincent bailed salt water at 3,875 feet.

In the Edgerly Pool, the Drysdale-Savoy Oil Co.'s No. 2 Hill is pumping 15 bbls. at 2,950 feet. C. M. Crotty's No. 14 Lilliard will make a pumper at 1,675 feet after being worked over.

The Edwards Petroleum Co.'s No. 4 Landry is being deepened. The Rex Petroleum Co.'s No. 3 Hunter is drilling around 4,000 feet.

In the Lockport Pool, the Vacuum-Gulf companies' joint No. 1 Farquhar blew out at 3,750 feet and is making dry gas. On the Miller lease the same interests are fishing in No. 6. No. 8 is shut down at 4,400 feet. Surface casing was set in No. 3 Friedberg & Wolf at 1,100 feet.

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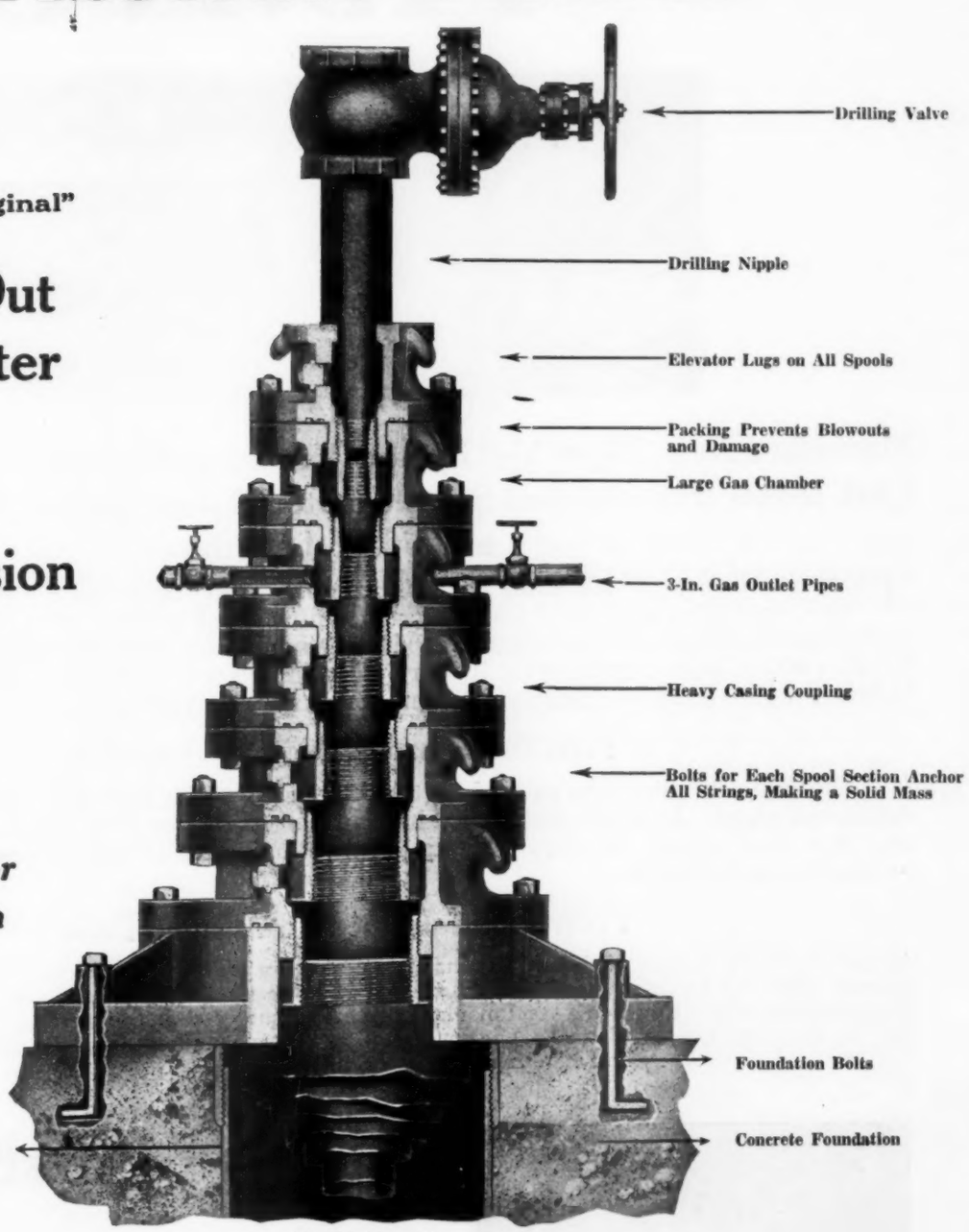

(Redick Patent)

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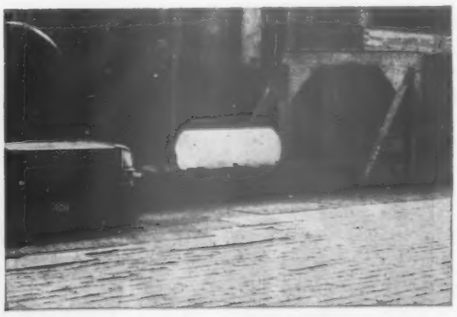
THE installation of this giant new Mannesman Pilger Mill was completed a few weeks ago, has been thoroughly tried out, and is now in full production. It was manufactured to our specifications and is housed in modern new buildings covering an area approximately 270 ft. x 800 ft. built expressly for it. Rarely is a complete mill unit completely designed and installed under such favorable conditions for quality and efficiency of production.

First Such Installation in America

It is the first seamless tube mill of its type and size to be installed and operated in an American plant. It is capable of turning out a tremendous tonnage of the finest quality seamless steel tubing in sizes ranging from six inches to 12 inches outside diameter, and in lengths up to fifty feet.

From Solid Ingot to Finished Tube

An extraordinary feature of this mill is that it successfully pierces a solid cast ingot, and in one continuous operation turns it out as a finished tube of large size. The ingots are all bottom cast, and the severe distortion to which a steel blank of this size is subjected in the piercing mill can be withstood only by the finest quality of steel. The rough hollow billet that comes from the piercing rolls therefore has passed a supreme test of its quality and soundness.



The round solid steel cast ingot leaving heating furnace for piercing mill.

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Pilgering, a Forging Process

IN pilgering, the unfinished part of the hollow billet is repeatedly forced between the eccentric pilger rolls which seize, compress, and force the billet back. At operating speed this becomes hammer-blow action on the steel, the same as a forging hammer. The thick-walled hollow billet about 8 feet long is thus pilgered (forged) into a tube of the desired wall thickness and in some cases, as in the above illustration, 65 feet long (before the ends are cropped).

Thus the superior quality steel which has passed its first test in the piercing operation is converted into a tube of the excellent texture that is a characteristic of pilgered steel. The pilgered tube now passes to a hot saw, the crop ends taken off, then to the sizing mill, cross rolls, and various cut-off and threading machines for the finishing operations. For certain finishes the pilgered tube is reheated and passes through a reeling machine before reaching the sizing mill.

A Boon to Oil Country Operators

These superior quality seamless steel tubes in large sizes and lengths for casing, drill pipe, etc., with their greater strength and elastic limit prove of wonderful advantage in oil country activities. Manufacturers in other industries also, are placing orders for material from this new mill. We have, of course, other seamless steel tube mills and manufacture boiler tubes, arch tubes, superheater flues, and tubing for automobile and other mechanical purposes. Your inquiries will be appreciated and our engineers will gladly give study to the possible application of "seamless" to your problems.

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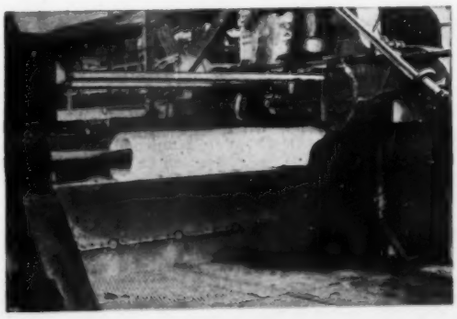


The rough hollow billet emerging from the piercing mill

Casing was set in No. 1 Bayou D'Inde at 3,650 feet. No. 2 is drilling at 1,765 feet. No. 4 Lock-Moore is below 6,000 feet. Locations have been made for Nos. 4 Bordages and 4-A Farquhar.

Operators are giving a good deal of attention to the southern Louisiana parishes in the hope of turning up new domes. Extensive geophysical exp'orations are being made from Cameron Parish on the border line, eastward. One saline dome is now being defined south of Stark and north of Vinton by the drilling of formation tests. It is reported the Gulf Refining Co. has discovered another near Napoleonville. A dozen tests are now drilling in seven of the southern parishes (counties). Some of these tests are very deep.

The Pure Oil Co. is setting casing in No. 3 at Sweet Lake in the southeastern part of Cameron Parish at 5,800 feet. The Sun-Humble Oil & Refining Co.'s joint No. 1 in the Johnson bayou section in the southwestern part of that parish is around 4,135 feet in hard lime rock.

The Vacuum Oil Co. has a test be'ow 4,350 feet on state prison land in West Feliciana Parish.

The Gulf Refining Co. has a location near Patterson, close to Morgan City. In Jeff Davis Parish, the Gulf and Emerson & Noble, jointly drilling No. 1 Hardy and H. C. Hanzsen, has one rigging going.

In St. Mary Parish, the Ohio Oil Co. is drilling No. 1 Burke, Lawrence & Schmidt No. 1 Moresi and Sabine Oil Co. No. 1 Herbert.

The United Oil & Gas Syndicate is making another deep test on the south side of the dome at Jefferson Island, Iberia Parish.

In Calcasieu Parish, F. F. Hintze is drilling No. 1 Beckenstein, Hanzsen and others' No. 1 Harlan, and the Gulf Refining Co. No. 4 Moore at Stark Dome.

Texas Coastal Wildcats

Brazoria County: Clemens Dome, Roxana Petroleum Corp.'s No. 3 drilling around 2,500 feet. No. 1 Pabst below 800 feet. No. 1 Bernard river location. Allen Dome, Roxana Petroleum Corp.'s No. 3 Allen drilling at 2,545 feet. No. 1 Allen derrick. The Texas Company has a location for No. 1 Mayes at Rattlesnake Mound.

Brazos County: J. A. Germany's No. 1 Vick, drilling around 2,000 feet.

Fort Bend County: Long Point, Gulf Production Co.'s No. 15 Davis below 3,010 feet. No. 16 Davis drilling around 876 feet. No. 17 Davis is around 1,220 feet. The Texas Company has a location at Beasley.

Jefferson County: At Fannette Dome, Gulf Production Co.'s No. 2 Bordages is drilling below 5,050 feet, the deepest wildcat test in the Coastal region at this time. No. 9 Thomas is around 3,000 feet. The Port Arthur Deve'opment Co.'s No. 4 West is drilling below 1,400 feet.

Liberty County: George Leand's No. 2 Grogan Lumber Co. is around 850 feet. The Sun Oil Co. has a location for No. 1 Chambers.

Hardin County: Olive Petroleum Co.'s No. 1 Sternberg is a location, as is the Texas Little Farms Association's No. 2 Hardin.

Matagorda County: Hawkins Dome, Gulf Production Co.'s No. 1 Parkinson drilling around 4,056 feet. No. 7 Craig rigging.

Wharton County: J. W. Rich and Humphreys Corp.'s Joint No. 1 Malone, 5 miles west of Wharton, shut down.

Montgomery County: Roxana Petroleum Corp. dril'ing a 3½-inch formation test east of Splendora.

Angelina County: Humble Oil & Refining Co.'s No. 1 Henderson drilling around 2,500 feet. Van Hatcher & Co.'s No. 1 Kountz is shut down at 2,005 feet. Flanigan Drilling Co.'s No. 1 Montooth idle at 1,340 feet.

Sabine County: The Texas Company's No. 1 Bell a derrick. Humble Oil & Refining Co.'s No. 1 Temp'e Lumber Co. lands, drilling around 1,650 feet. Ertell and others' No. 1 Kenny, location. Crater Oil Co.'s No. 1 American Lumber Co. lands drilled to 2,960 feet and is now plugging back to 2,765 feet. Sebastian & Smith's No. 1 Werner drilling around 2,765 feet.

Orange County: E. W. Ogden's No. 1 Stark, derrick.

Trinity County: Mills Bennett Production Co.'s No. 1 Conn is a location.

Lavaca County: Hami'l Drilling Co., near Port Lavaca, is drilling around 2,875 feet.

Jackson County: Houston Oil Co.'s No. 1 near Inez is drilling. Wright Brothers drilling Nos. 4 Drushell and 1 Calasseum. Norton and others' No. 1 Fenner rigging.

SOUTHWEST WILDCATS

(Continued from Page 54)

far. An effort will be made to complete it as an oil well, and if successful it will be the first oil well around that gas area, which is a couple of miles south of the Ina oil field.

Hadley-Marland's No. 1 De Spain on Survey No. 49, about 5 miles north and a little east of the Carolina-Texas field in Webb County, which was thought to have a chance to pick up the 2,600-foot sand that produced in the Associated-Carson well in Caro'ina-Texas, was coring below 2,500 feet. It found sands above that depth which carried a little oil in the Bordo well a mile north, but in the Hadley-Marland well these sands were dry, which may be prophetic of the 2,600-foot sand.

Duval County

Daniel & Best are to spud in this week in No. 1 J. Benavides, Block 1, Subdivision 3, located 150 feet from the northeast line and 300 feet from the east line. Buffam and others, Block 38, Mesquite ranch, 150 feet from the east line and 660 feet from the east line, are drilling at 1,000 feet in No. 1 J. Benavides. O'Hern & Seacord's No. 2 Benavides, Survey 174, Block 12, 5 miles south of Cin-Tex Field, total depth 1,-789 feet, is ready to drill in. Moody Oil Corp.'s No. 1 Guerra, in the Guerra tract, is a location, 150 feet from the northwest and southwest lines. In the northern end of Survey 4, Humble Oil & Refining Co.'s No. 10 Singer is drilling in gumbo and pyrites at 725 feet, and No. 5 Schaller, Survey 255, is drilling in shale at 3,104 feet. Location of No. 5 is in north central part of the survey. Humble-Reiter-Foster have completed a water well, and have spudded in No. 1 Kohler, Survey 406, 660 feet from the south and east lines, and are drilling a water well on Survey 168, for No. 2 Kohler. Simms Oil Co.'s No. 1 Schallert, Survey 241, total depth 3,752 feet. George M. Ball's No. 1 Roach, Survey 463, is drilling at 3,320 feet. National Refining-Lewis Oil Co., in survey 668, No. 1 Dinn, 200 feet from the east and south lines, has spudded in and is drilling at 250 feet. Humble Oil & Refining Co.'s No. 1 Dowdy, Survey 272, has resumed drilling and is at 3,353 feet. Houston Oil Co.'s No. 1 Beale, SW, Survey 571, is standing at 2,449 feet, tested salt water.

Jim Hogg County

Ballard and Underwood are preparing to drill in the Cuevitas Survey, in the south part of the county. Moody Oil Corp.'s No. 1 Palacious, Survey 287, Block 13, is standing in hard rock at 1,-600 feet. Location is 150 feet from the south and west lines. Haslitt-Simmons' No. 1 Schroder, Survey 16, Block 10, is drilling 150 feet from the north and west lines, at 1,764 feet. In SW cor. of Block 247, Hoad and others' No. 1 Palacious, is coring at 1,900 feet. L. M. Holden's No. 2 Jones, 6 miles east of Holbronville, and 1 mile north of No. 1, is drilling at 3,200 feet. Associated Oil Co.'s No. 1 Lopez, Block 20, Share 1, is drilling 600 feet from the south line and 414 feet from the west line at 2,184 feet. At 2,147 feet, well made 50 bbls. of oil and 2,000,000 feet of gas, some salt water. T. G. Shaw interests made location for No. 1 Holbien, Block 21, 1,-319 feet from the west line and 1,922 feet from the south line.

Webb County

Cole Petroleum Co.'s No. 9 "A" Benavides, Survey 753, Block 7, is coring at 3,275 feet, and No. 10 "B" Benavides, Block 5, Survey 3, is drilling at 4,000 feet. W. A. Wheatley and others' No. 1 Reiser, Block 7, Survey 1,618, 150 feet from the north line and 300 feet from the west line, is drilling at 1,420 feet. Near central part of Survey 49, Hadley-Marland's No. 1 De Spain is drilling at 2,216 feet. M. J. Bashara's No. 1 Espejo, Block 75, 222 feet from the west line and 55 feet from the south line, has spudded in and is drilling at 245 feet. Magnolia Petroleum Co.'s No. 1 Neal, Survey 132, Block 12, 5 miles SW of the Cole Gas Field, is drilling at 3,415 feet and Magnolia's No. 1 Paige-Garcia, Survey 611, is drilling at 1,845 feet, 150 feet from west corner of Survey 139. Lane-The Texas Company, in the city limits of Laredo, is fishing at 2,930 feet. Yeager-Lumpkins' No. 1 Yeager, Quigg Subdivision, Porcions 33, 34, and 35, is a location. Henne, Winch & Killam's No. 1 Billings, NE SW, Survey 43, has the derrick up, 150 feet from the NW cor.

Atascosa County

Witherspoon Oil Co.'s No. 2 Turpe, 2,-400 feet southwest of No. 1, is drilling at 2,000 feet. Well was completed as small oil well, and is drilling deeper. W. G. French's No. 1 Frank Jaksik, in SW cor. of farm, is drilling in hard shale at 2,323 feet.

Bexar County

W. L. McClanahan's No. 2 Sodrok, 300 feet east of No. 1, has resumed drilling at 1,405 feet and will make a deep test. Well bailed a little oil at 1,405 feet, but was later abandoned. Murphy & Thorkelsen, on the Ivan Vick lease, 2,106 feet north of the Corpus Christi road, is drilling in hard rock at 1,387 feet. B. F. Thompson's No. 1 has derrick up and is preparing to spud in for a test in eastern Bexar County.

Bastrop County

Johnson Brothers are spudding in the No. 1 Williams. Neal A. Nelson, 5 miles south of Smithville on the Arthur Naumann lease, bailed at 940 feet with showing of oil.

Blanco County

G. L. Jones and E. D. Summerow are drilling at 240 feet 1½ miles west of Pedernales River, on a lease of 12,500 acres.

Brooks County

Ballard & Underwood's No. 1 Lasater, Survey 331, 621 feet from the north line and 150 feet from the east line, is waiting at 2,212 feet for milling tools.

Brewster County

Green Valley Oil Corp. is spudding in No. 3 Wilson, 20 feet south of No. 1, and 40 feet from No. 1; No. 2 Wilson is shut down at 2,170 feet.

Caldwell County

Reiter-Foster Oil Corp.'s No. 1 Riddle is rigging up for test.

DeWitt County

Empire Southern Oil Co.'s No. 1 C. G. Smith, west of Cuero, will spud in within 10 days.

Edwards County

X. K. Stout's No. 2 Peterson, 2,000 feet west of No. 1, is drilling at 4,310 feet with a little oil showing at 4,225 feet.

Fayette County

G. W. Page and George W. Zeigin's test, on the Rosa Russell lease, 1 mile northwest of Schulenberg, is preparing to resume.

Gonzales County

Martin Oil & Development Co.'s No. 1 Preston, near Cheapside, is drilling at 950 feet.

Guadalupe County

The Texas Company is preparing to drill on the Hilmer Glenwinkle tract. J. M. Davis' No. 1 Rosenbrock is drilling at 1,400 feet.

Karnes County

Earl B. Reynolds' No. 2 Butler, 1,000 feet south of No. 1, is coring in sand at 1,730 feet.

Lampasas County

Fritz Fuchs Oil Co., 12 miles west of Lampasas, is drilling at 320 feet on the W. M. Aynesworth lease.

LaSalle County

DeLange, Eiser Development Co.'s No. 1 Dobie (fee), Survey 102, is drilling at 1,445 feet in hard packed sand. Location is 600 feet from the east line and 1,800 feet from the south line.

Lee County

Donald P. Davis started October 1 drill on the Noack lease, in Lee County.

Live Oak County

Simmons Oil Co.'s No. 4 Sartin, north offset to No. 2, is setting 8-inch casing at 800 feet, and has cored 9 feet of sand carrying oil. It has abandoned No. 3 Sartin, which came in a gasser and went wild, and caused loss of the hole. Depth of No. 3 was 1,346 feet.

Medina County

Arnett Oil Co.'s No. 4 Nixon, 2,1 feet south of No. 3, in Ina Field, is bailing at 1,312 feet, and getting a little oil. In the Adams Gas Field in Medina County, Western Gas & Fuel Co.'s No. 1 Adams is drilling at 1,021 feet, with a show of oil. In center of the 25-acre tract of Western Gas & Fuel Co.'s No. 2 Adams has been spudded in. Medina Oil Co.'s No. 8 Taylor, southeast of the discovery well No. 1, pumped 87 bbls. in 14 hours. Fennell and others' No. 1 John east 100 acres, in Survey 115, has reached casing at 475 feet. Golden West Oil Co. southwest of Castorville, on the Jones-Courand lease, is drilling at 1,040 feet. Alamo Drilling & Leasing Co.'s test, on Kennedy tract, 1 mile east of the county line, south of Sabinal Road, has 10 feet of sand and is drilling deeper. Ina Oil Co.'s No. 1 Charles Finger, center of Survey 746, is moving on rotary to complete a fishing job. California-Medina No. 1 Rothe, which has been shut down since July, at 3,107 feet, has renewed leases and is preparing to resume drilling. Cecil Switzer's No. 1 Zerr, Survey 459, has received timbers to change to large rig.

Maverick County

Humble Oil & Refining Co.'s No. 1 Hanchett, half mile west of the Dimmit County line, is drilling at 1,370 feet.

McMullen County

Healdton Oil & Gas Co. of Enid, Okla. has a rig on the ground and derrick up for No. 1 Franklin, in southwest of Survey 31. Coyle-Concord Oil Co.'s test, on Mat Martin ranch, 18 miles south of Fowlerton, is drilling at 1,300 feet. Well had oil showings at 700 and 1,100 feet.

Refugio County

W. L. Pearson's No. 1 Wilson Heard at 1,620 feet, is an average gas well which has been turned into the lines of the Houston Gulf Gas Co. Houston Oil Co.'s No. 7 Rooke has an average gas well in a new sand for the south part of the field.

Starr County

Danciger and Dauchy & Maddox's No. 1 Newman, Survey 232, in Judd ranch, 980 feet from the north line and 980 feet from the east line, has made location and will spud in within a few days. Southern Exploration Co.'s No. 1 Guerra, Porcion 69, is laying a water line from the river, and will be ready to spud in as soon as it is finished. Simms Oil Co.'s No. 1 Salinas, Porcions 80, 81, Block 6, is spudding in. Pearson and others' No. 1 Garcia, Survey 933, NW cor. is ready to spud in.

MEXICAN FIELDS

(Continued from Page 45)

Mex Oil Co., lost his life Sunday evening when a speed boat in which he and a party of oil men were coming down the Tamesi River, in doubling a bend, collided with an up-river cruiser. Haynes jumped clear of the launch, but never came up. All of his companions were saved, some of them by merely clinging to the damaged launch. Haynes was a young man with many friends to his credit in this district. He is survived by his wife and infant child.

Charles Miester, a tool dresser on one of the National Lines' Tamesi River rigs, and E. Monreal, Mexican camp watchman for the same concern, were drowned earlier in the week by a canoe capsizing with them while they were running from the rig to the permanent camp. Their bodies were recovered later.

The rains are continuing and roads are impassable, and the river's bank full with pronounced currents.

Service Facts

about STERLING OIL CONDENSING SECTIONS

The Absorption Plant handling the largest volume of gas in the mid-continent field is equipped with Sterling Oil Condensing Sections exclusively.

The Absorption Plant recovering the greatest amount of gasoline in the mid-continent field is equipped with Sterling Oil Condensing Sections exclusively.

The first Charcoal Recovery Absorption Plant in the mid-continent field is equipped with Sterling Oil Condensing Sections exclusively.

(The names and locations of these plants will gladly be furnished on request.)

Ten good reasons why Sterling Sections supplant old-style coils

1. Cheaper to install
2. Only half the box area needed
3. Condense more rapidly
4. Minimize oil vapor loss
5. Distillate always runs cool into tail house
6. Eliminate back pressure in stills
7. Outlast coils — resist corrosion
8. Men work easily between stacks, cleaning, repairing or replacing
9. No clogging with wax oils or other heavy distillates
10. 100% salvage value. Easy to take down, easy to reassemble.

Let one of our engineers call and tell you about Sterling Sections. Send to any address below for booklet describing them.

Sterling Oil Condensing Sections as they are assembled in stacks in Condenser box.

STERLING OIL SECTIONS

For manifold use-for continuous use-for cooling

AMERICAN RADIATOR COMPANY

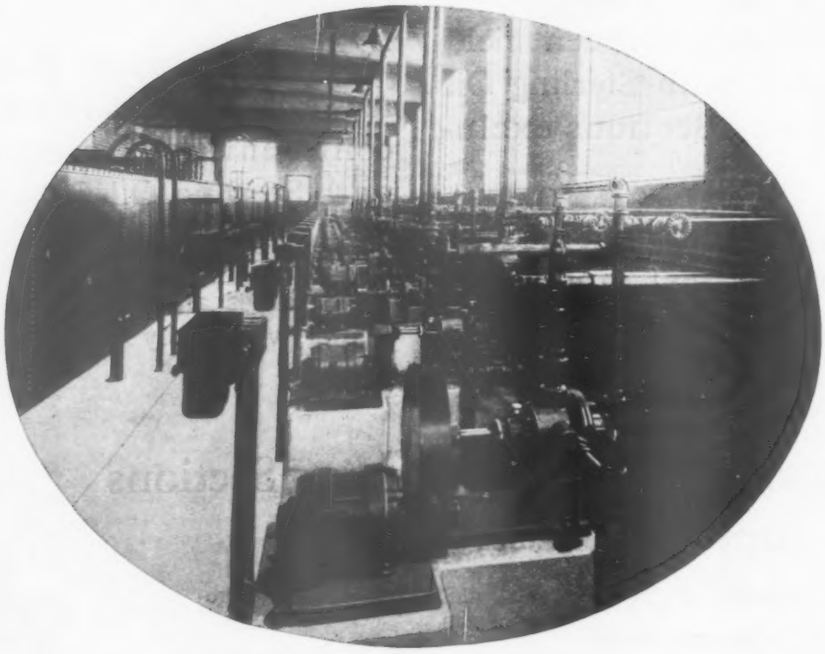
Manufacturers of IDEAL BOILERS *for* OIL BURNING

40 West 40th Street, New York, N. Y. 816 South Michigan Avenue, Chicago, Ill.

Also sold by National Supply Companies

Sterling Oil Sections are immediately available at our plants in Kansas City, Mo., and Springfield, Ohio

BLACKMER ROTARY PUMPS



Particularly for the Oil Refiner

In the oval above is shown an installation of thirteen Blackmer Single Electric Units in a filter plant pump house of a large mid-continent refinery. These pumps are handling paraffine, vaseline, and lube oils at all stages of the process from charging the filters to loading tank cars.

On jobs such as this where unfailing twenty-four-hour-a-day service is demanded—where the pumping cost must be kept down to an absolute minimum — where a production schedule must be maintained—

Blackmer Rotary Pumps do the job and do it well. Ask for information about Blackmer Refinery Pumps.

More Gallons Per Dollar

BLACKMER PUMP CO.

1809 Century Ave. **Grand Rapids, Mich.**

Offices in 18 Principal Cities

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OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
MISSOULA
SAL
VIRGIN
MARTINEZ
RICHMOND
SAN FRANCISCO
ASSOCIATED
SHELL
STANDARD
PACIFIC GROVE
FRESNO
ASSOCIATED
STANDARD
ASSOCIATED
UNION
STANDARD
ASSOCIATED
PORT SAN LUIS
UNION
MC KITTRICK
UNION
BAKERSFIELD
STANDARD

Th
PROD

Map

With L

Hig

Number of miles of trunk lines .....

Average quantity of crud

Investment in oil pip

Investment in tank s

Investment in tank

Investment in tank t

Total investment tion .....

Investment in teleg phone lines .....

Crude oil is transp

SUNBURST
HOMESTAKE
ILLINOIS
SHELBY
GREAT FALLS
MISSOULA
CONTINENTAL
Cat Creek
LEWISTOWN
WINNETT
BUTTE
MILES CITY
ELK BASIN
ILLINOIS
GREYBULL
ILLINOIS
OHIO OIL
ILLINOIS
WINCHESTER
SINGER
THERMOPOLIS
ILLINOIS
LANDER
DERBY DOME WYO.
ILLINOIS
MIDWEST REF.
PROD & REF.
SALTCREEK
TEAPOT
R.Y. OIL
ILLINOIS
FARCO WYO.
Salem Dome
GLENROCK
CASPER
STATTOOR
ILLINOIS
PROD & REF.
PROD & REF.
PARCO
Simpson Ridge
PROD & REF.
ILLINOIS
LARAMIE
ILLINOIS
OMAHA REF.
OSAGE
DEWEY
ILLINOIS
DOUGLAS
LUSK
FT LARAMIE STA.
SINCLAIR
KEYSTONE
SALT LAKE CITY
CRAIG
TEXAS
Moffat Field
BOULDER
DENVER
FLORENCE
FARMINGTON
MIDWEST REF.
M O N T A N A
W Y O M I N G
C O L O R A D O
N E B R A
K A
A H

The OIL and GAS JOURNAL

PRODUCING REFINING MARKETING

Map of Oil Trunk Pipe Lin

With Locations of Refineries Shown by Circles

(Copyright 1926 by The Petroleum Publishing Company, Tulsa, Okla.)

High Spots in Transportation of Petroleum

Number of miles of trunk and gathering oil pipe lines	85,000
Average quantity of crude handled daily, bbls.	2,000,000
Investment in oil pipe lines	$ 800,000,000
Investment in tank steamers	450,000,000
Investment in tank cars	300,000,000
Investment in tank trucks	100,000,000
Total investment in transportation	$1,650,000,000
Investment in telegraph and telephone lines	$ 24,500,000

Total annual expenditure for transp—pipe lines, tankers, tank cars a trucks	$25
Number of tank cars, supplementi lines	

Volume of Annual Oil Move

By pipe lines	75
By tankers from Gulf to Atlantic Coast ports	11
By tankers, coastwise from California to eastern points	28
Foreign	11
By tank trucks	223
By tank cars	402

Crude oil is transported through pipelines at an average rate of four miles an

Lines

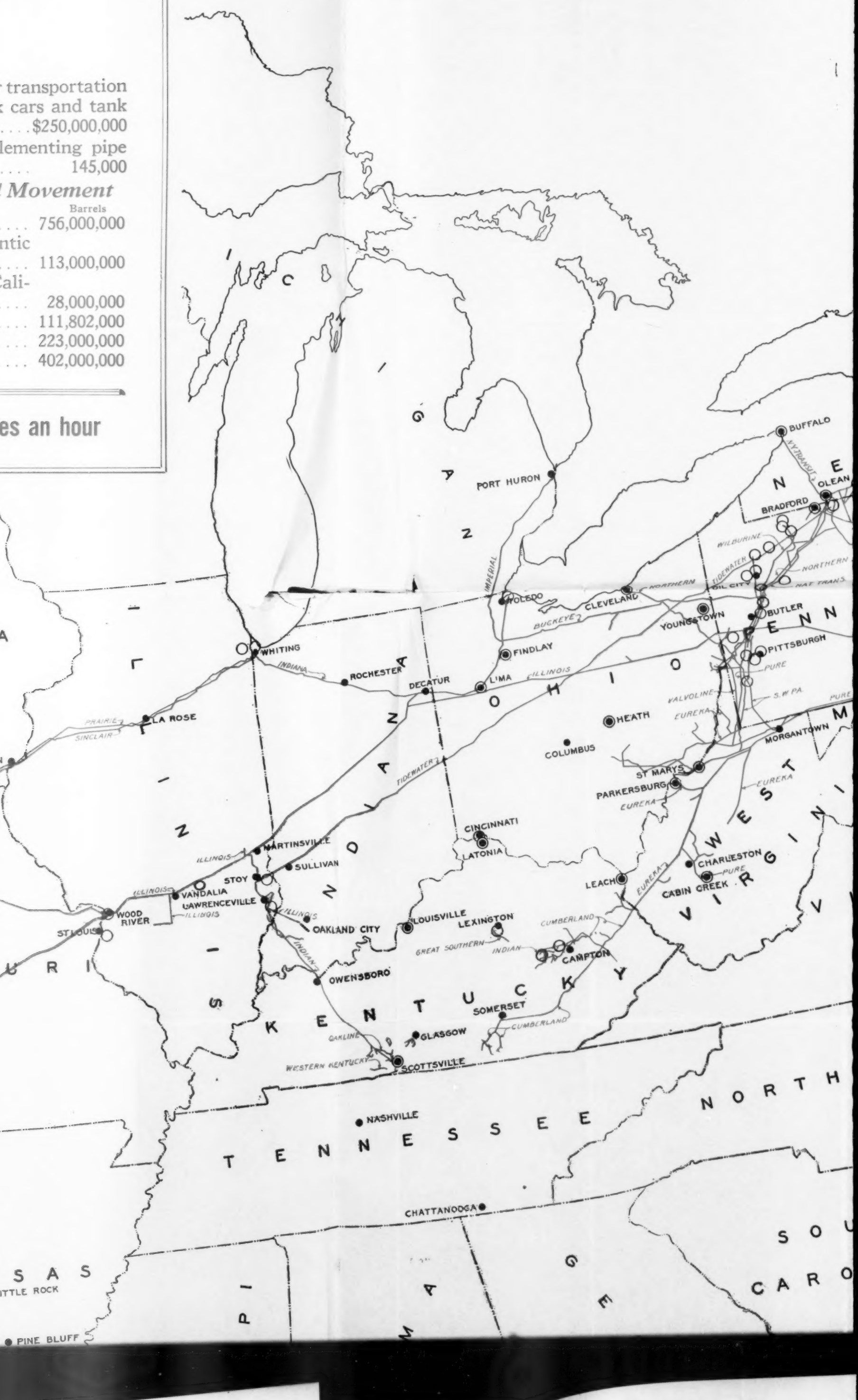
es

r transportation
k cars and tank
. . . . $250,000,000
lementing pipe
. . . . 145,000

l Movement

Barrels
. . . . 756,000,000
ntic
. . . . 113,000,000
Cali-
. . . . 28,000,000
. . . . 111,802,000
. . . . 223,000,000
. . . . 402,000,000

es an hour



VIS

GERONIMO

WALTER

SULPHUR

PINE BL

M

VERMONT

NEW HAMPSHIRE

MASSAC

PROVID

CONNECTIC

NEW YORK

BUFFALO

HALES EDDY

NEW YORK TRANSIT

OLEAN

WELLSVILLE

ATHENS

BRADFORD

WILLIAMSPORT

NEW YORK

BAYONNE

NEW JERSEY

PORT HURON

IMPERIAL

WILBURINE

TIDEWATER

NORTHERN

NATIONAL TRANSIT

SUNBURY

TOLEDO

CLEVELAND

OIL CITY

NAT TRANS.

BUCKEYE

YOUNGSTOWN

BUTLER

LEBANON

PHILADELPHIA

FUSCARORA

PAULSBORO

FINDLAY

PITTSBURGH

ROCHESTER

DECATUR

LIMA

ILLINOIS

PURE

SOUTHERN

VALVOLINE

S.W.PA.

MARYLAND P.L.CO.

PURE OIL

EUREKA

BALTIMORE

DELAWARE

HEATH

MORGANTOWN

COLUMBUS

ST MARYS

PARKERSBURG

CINCINNATI

LATONIA

CHARLESTON

LEACH

CABIN CREEK

LOUISVILLE

LEXINGTON

CUMBERLAND

GREAT SOUTHERN

INDIAN

CAMPTON

NORFOLK

SOMERSET

GLASGOW

SCOTTSVILLE

NASHVILLE

CHATTANOOGA

NEW YORK

PENNSYLVANIA

WEST VIRGINIA

VIRGINIA

NORTH CAROLINA

SOUTH

● PINE BLUFF

M A I N E
NEW HAMPSH
EVERETT
S S A C H U S E T T
FALL RIVER
RHODE
PROVIDEN
NNECTICUT

LUSK

NEVADA
ARIZO
MARTINEZ
RICHMOND
SAN FRANCISCO
ASSOCIATED
SHELL
STANDARD
PACIFIC GROVE
FRESNO
ASSOCIATED
STANDARD
ASSOCIATED
UNION
STANDARD
UNION
PORT SAN LUIS
MC KITTRICK
BAKERSFIELD
UNION
STANDARD
SUNSET
MIDWAY
PAN AMER
ASSOCIATED
MOJAVE
SANTA BARARA
STANDARD
GENERAL
UNION
VENTURA
LOS ANGELES
BREA
CALIF PETR CORP
ASSOCIATED
GENERAL
SHELL
STANDARD
UNION
SAN PEDRO
ASSOCIATED
VIRGIN
PHOENIX

LUSK

ILLINOIS — PROD. & REF.

PROD. & REF.

PARCO — Simpson Ridge

PROD. & REF.

ILLINOIS

FT LARAMIE STA.

SINCLAIR

LARAMIE

KEYSTONE

N E B R A

SALT LAKE CITY

CRAIG

TEXAS

Hoffat Field

BOULDER

DENVER

T A H

C O L O R A D O

K A

FLORENCE

FARMINGTON

MIDWEST REF.

CONTINENTAL

GALLUP

ALBUQUERQUE

TUCUMCARI

O N A

N E W M E X I C O

CLOVIS

Dixon Canyon

MAGNOLIA

KINGS MILL

PANTEX

GULF

PLAINS

PANHANDLE

McLEAN

AMARILLO

PRAIRIE

ROSWELL

DAYTON

COLORADO

EL PASO

T E

Mc CAMEY

BIG LAKE

CLEVELAND

BUCKEYE

YOUNGSTOWN

BUTLER

E N N S

USK
FT LARAMIE STA.
SINCLAIR
NEBRASKA
KEYSTONE
ALFALFA CENTER
WASHINGTON
IOWA
FT MADISON
PRAIRIE
LA PLATA
CARROLLTON
SUGAR CREEK
KANSAS CITY
SINCLAIR
PRAIRIE
FREEMAN
MISSOURI
CENTERVILLE
ER
A D O
RUSSELL
KANSAS
PRAIRIE
EMPIRE
SINCLAIR
EUREKA
ELDORADO
WICHITA
BARNSDALL
EMPIRE
OKLAHOMA
GULF
PRAIRIE
JOPLIN
OMAHA
PRAIRIE
OKLAHOMA
TEXAS
BURBANK
SINCLAIR
TONKAWA
SINCLAIR
COLENE
HOMINY
COSDEN
BARNSDALE
COSDEN
EMPIRE
OZARK
CUSHING
TULSA
PIERCE
OKLAHOMA
GUTHRIE
OZARK
MAGNOLIA
DRUMRIGH
BARNSDALL
OKMULGEE
CROMWELL
HENRYETTA
WEWOKA
COSDEN
FT SMITH
ARKANS
LITTLE
Dixon Canyon
MAGNOLIA
PANTEX
GULF
PLAINS
KINGS MILL
PANHANDLE
AMARILLO
McLEAN
SAYRE
PRAIRIE
CARL
(BUILDING)
TUCUMCARI
C O
CLOVIS
SINCLAIR
PRAIRIE
MAGNOLIA
LAWTON
DUNCAN
GERONIMO
WALTER
PAULS VALLEY
ADA
SULPHUR
HEALDTON
ARDMORE
RINGLING
HEWITT
EMPIRE
BRANNON
ELECTRA
TEXAS
OKLAHOMA
HUGO
DE QUEEN
STANDARD LA
PIN
ROSWELL
MAGNOLIA
GULF
BOWIE
GAINESVILLE
PIERCE
TEXAS
SHERMAN
CAMDEN
SMACKOVER
MAGNOLIA
ATLANTIC
TEXAS
LA O&R
TEXARKANA
ELDORADO
GULF
STANDA
PRAIRIE
SINCLAIR
MAGNOLIA
TEXAS
GULF
FITCH
SHREVEPORT-ELD
STANDARD LA
LA OIL REF
OIL CITY
CADDO CENT
HOMER
CRUSADER
DAYTON
GRAFORD
TEXAS
GULF
FT WORTH
DALLAS
BRECKENRIDGE
TEXAS
MAGNOLIA
SHREVEPORT
MONROE
GULF
SHREVEPORT PAR
COLORADO
UNITED PROD
PRAIRIE
SINCLAIR
MAGNOLIA
CORSICANA
TEXAS
BULL BAYOU
GULF
MAGNO
BOGALUSA
CENTER
STANDARD
MEXIA
GULF
HUMBLE
CENTERVILLE
T E X A S
Mc CAMEY
BIG LAKE
HUMBLE
PRAIRIE
MAGNOLIA
SUN
TEXAS
COASTAL O&R
CROWLE
DALE
LULING
GRAYBURG
SAN ANTONIO
MAGNOLIA
SEALY
SCHULENBERG
HOUSTON
PRAIRIE
HUMBLE
SUN
BEAUMONT
PORT ARTHUR
GALVESTON
TEXAS
HUMBLE
BRYAN MOUND
MAGNOLIA
HUMBLE
INGLESIDE
BRUNI
MIRANDO CITY

WHITING
INDIANA
ROCHESTER
DECATUR
FINDLAY
LIMA
ILLINOIS
CLEVELAND
BUCKEYE
YOUNGSTOWN
BUTLER
PITTSBURGH
PURE
VALVOLINE
S.W. PA
EUREKA
HEATH
COLUMBUS
MORGANTOWN
ST MARYS
PARKERSBURG
TIDEWATER
LA ROSE
PRAIRIE
SINCLAIR
MARTINSVILLE
SULLIVAN
STOY
VANDALIA
LAWRENCEVILLE
WOOD RIVER
ST LOUIS
CINCINNATI
LATONIA
CHARLESTON
LEACH
CABIN CREEK
OAKLAND CITY
LOUISVILLE
LEXINGTON
CUMBERLAND
GREAT SOUTHERN
INDIAN
CAMPTON
OWENSBORO
SOMERSET
OAKLINE
GLASGOW
WESTERN KENTUCKY
SCOTTSVILLE
NASHVILLE
CHATTANOOGA
LITTLE ROCK
PINE BLUFF
STANDARD LA
SHREVEPORT-ELDORADO
MONROE
VIDALIA
ALEXANDRIA
BATON ROUGE
CROWLEY
NEW ORLEANS
BRUNSWICK
TA

O W A

WHITING
INDIANA
ROCHESTER
DECATUR
LIMA
ILLINOIS
FINDLAY
TOLEDO
CLEVEL
BUCKEYE
O H I O
PRAIRIE
SINCLAIR
LA ROSE
FT MADISON
PRAIRIE
LA PLATA
TIDEWATER
COLUMBUS
PARKE
CINCINNATI
LATONIA
MARTINSVILLE
ILLINOIS
SULLIVAN
CARROLLTON
SUGAR CREEK
KANSAS CITY
PRAIRIE
STOY
VANDALIA
LAWRENCEVILLE
ILLINOIS
ILLINOIS
WOOD RIVER
ST LOUIS
OAKLAND CITY
LOUISVILLE
LEXINGTON
LEACH
CUMBERLAND
GREAT SOUTHERN
INDIAN
CAMPTON
PRAIRIE
SINCLAIR
FREEMAN
M I S S O U R I
CENTERVILLE
OWENSBORO
K E N T U C K Y
OSAGE
SOMERSET
CUMBERLAND
GLASGOW
DARLING
WESTERN KENTUCKY
SCOTTSVILLE
JOPLIN
PRAIRIE
SINCLAIR
NASHVILLE
T E N N E S S E E
CHATTANOOGA
FT SMITH
A R K A N S A S
LITTLE ROCK
PINE BLUFF
HUGO
DE QUEEN
CAMDEN
SMACKOVER
ATLANTIC
MAGNOLIA
TEXAS
TEXARKANA
ELDORADO
GULF
STANDARD LA
FITCH
SHREVEPORT-ELDORADO
STANDARD LA
LA OIL REF
OIL CITY
HOMER
CADDO CENT
SHREVEPORT
MONROE
GULF
SHREVEPORT P&R
CRUSADER
MAGNOLIA
CORSICANA
TEXAS
MEXIA
GULF
BULL BAYOU
LOGANSPORT
CENTER
STANDARD
VIDALIA
ALEXANDRIA
HUMBLE
CENTERVILLE
PRAIRIE
MAGNOLIA
SUN
TEXAS
GULF
TEXAS
COASTAL O B R
CROWLEY
BATON ROUGE
DALE
SEALY
BEAUMONT
PRAIRIE
HUMBLE
SUN
PORT ARTHUR
LULING
MAGNOLIA
HOUSTON
NEW ORLEANS
SCHULENBERG
SAN ANTONIO
TEXAS
HUMBLE
GALVESTON
BRYAN MOUND
INGLESIDE

ELAND
YOUNGSTOWN
BUTLER
PENNSYLV
PITTSBURGH
TUSCARORA
LEBANON
NAT. TRANS.
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CHARLESTON
PURE
CABIN CREEK
VIRGINIA
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FLORIDA
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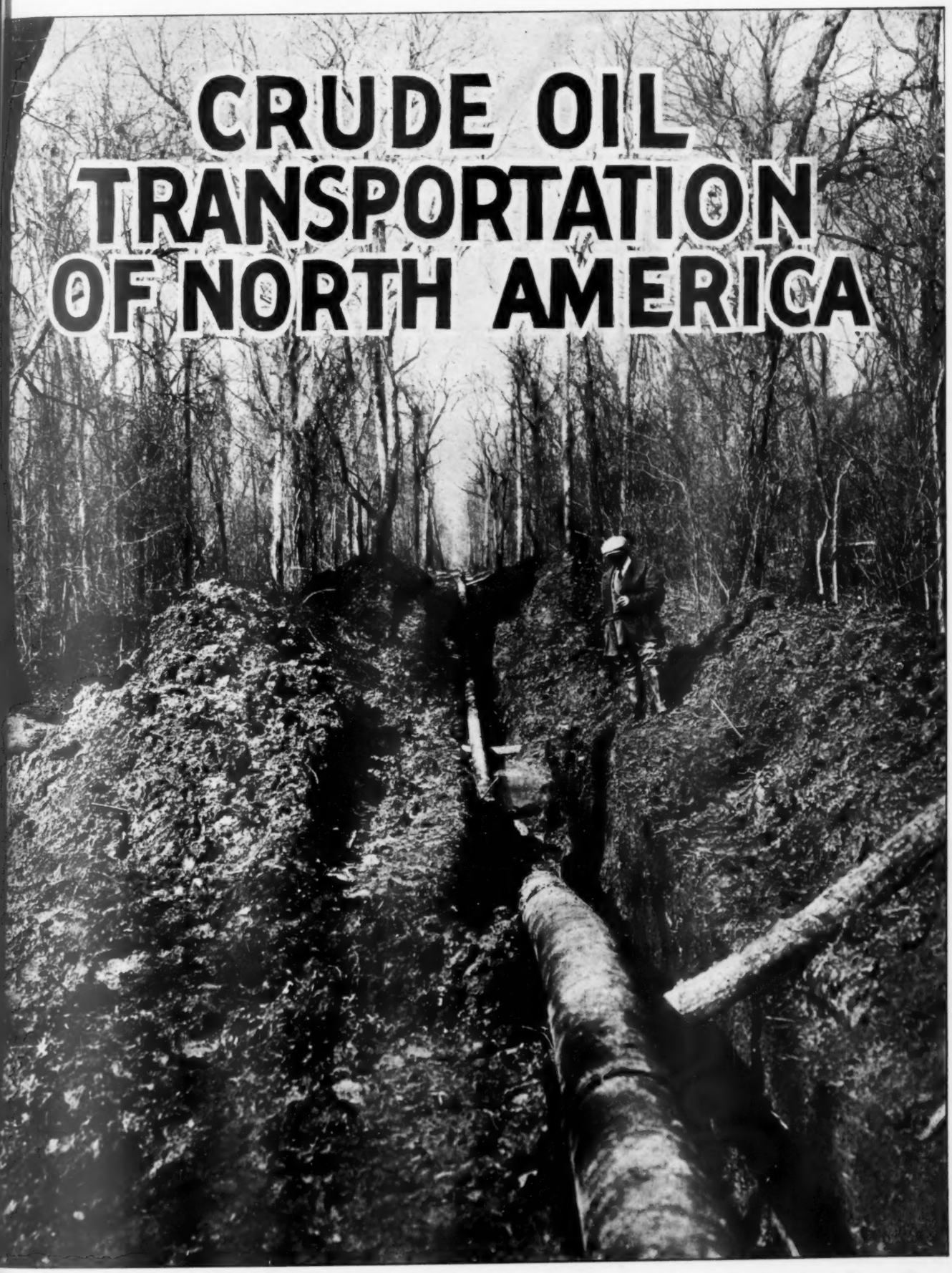
ber 7,

CRUDE OIL TRANSPORTATION OF NORTH AMERICA



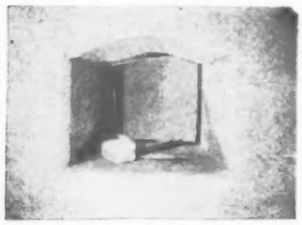
1 Some of the old firebrick has been ripped out, exposing the common brick.

4 Form completed and ready for installation of Plibrico.

7 Arch almost completed; corners are being rounded off.

2 Plibrico walls have been built up; bricks to support arch form are being put in place.

5 Plibrico being installed over the form with mallets.



8 Form removed; completed arch ready for vitrification.

3 Form for the arch is being built; slats are laid over shaped piece of wood.

6 Trimming the arch with trowels.

9 The arch and adjacent walls after a period of hard service.

Get 100% longer furnace life

Reline and repair furnaces this speedy way

THE illustrations above are taken from a movie made during the complete relining of a 250 hp. oil-burning water tube boiler with plastic Plibrico Furnace Lining.

At least 100% longer life

That's what you get with Plibrico under boilers and stills. Plibrico is monolithic. It is installed while plastic. Heat bakes it—gives a jointless lining. Often it outlasts firebrick three, four and five times.

Cuts installation cost

Anyone, under the supervision of our engineer, can install Plibrico. Or we can supply an experienced boiler setting or installation crew. Plibrico can be installed in less time than firebrick because it is plastic.

Eliminates special shapes

Special shapes are costly—easily broken—hard to repair. Because Plibrico is plastic, it does away with them and with the need of keeping a big supply on hand.

Cuts heat loss

Plibrico walls have no leaky joints. The heat is kept in—the cold is kept out. CO_2 is increased. Excess air is decreased.

Over 19,000 users

have tried and proved Plibrico. It is installed under boilers aggregating millions of horsepower, and under hundreds of oil stills.

Ideal for repairing

Keep a container on hand for repairs. Use Plibrico for replacing a few bricks or a whole front or side wall. Economy is greatest when used for the complete setting.

We'll send an engineer

The coupon brings the engineer to your plant to figure on your repairing or boiler setting. Engineers and installation crews in 85 cities.

The Plibrico Diffusing Furnace...

Here is an unusual still furnace design (patents applied for) that makes four economies. 1. It ends still bottom buckling. 2. It gives uniform still temperature. 3. It gives greater fuel economy. 4. It gives longer furnace life. Check the coupon if you'd like detailed information.

Send the engineer

to figure on our repairing. No obligation.

Firm .....

Address .....

.....

My name .....

☐ **Send more data on the Diffusing Furnace.**

Mail to Plibrico Jointless Firebrick Co.
1846 Kingsbury Street, Chicago, Illinois

Plibrico Jointless Firebrick Co.
World's largest manufacturers of plastic furnace lining.
1846 Kingsbury Street, Chicago, Illinois
Factories: Chicago and Trenton, N. J.

PLIBRICO *furnace lining*
REG. U.S. PATENT OFFICE

What the Pipeline Means

By W. T. ANDERSON

America has 20,000,000 motor cars largely because 100,000,000 Americans know they can get motor fuel to run those cars at practically any place in the country any time they want it.

The service station is never "sold out." The refiners need never complain of "delayed deliveries," the frequent experience of manufacturers in other lines who have to depend upon the vicissitudes of transportation.

The oil industry, peculiar to itself in so many phases, is peculiar also in possessing and operating its own channels of transportation.

Without the pipeline system and with the oil industry dependent upon other modes of transportation of crude oil to the refineries the vast majority of us would still be afoot because the development of the use of the motor car would have been handicapped by the difficulty and delay in moving oil.

How many would buy an automobile if every so often they had to ask the filling station when they expected to get their gasoline shipment?

How often have you had that experience with other commodities? Say, with coal.

The oil pipeline system has made that impossible in the oil business. It assures an adequate and exact supply of oil at all times at all points where it is needed. No other industry has offered such an assurance.

Let us suppose for a moment that we had no pipelines and had to depend on rail transportation for the movement of crude.

The pipelines are moving 2,000,000 barrels of crude a day. That is 730,000,000 barrels, or approximately 110,000,000 tons a year.

The total movement of all our manufacturing industries in 1925 was 285,245,000 tons. Take the iron industry's freight; its bar and sheet iron, structural iron and iron pipe handled by the railroads of the country was not quite 30,000,000 tons in 1925. Iron, pig and bloom, tonnage hauled amounted to less than half that.

Cement shipments, another heavy product, gave the railroads less than 25,000,000 tons. Brick and artificial stone shipments were not quite 20,000,000 tons.

Pile on the total movement of automobiles and auto parts hauled by rail, some 7,000,000 tons, and add almost 10,000,000 tons of chemicals and explosives moved and you have not equalled the tonnage of crude oil moved by the pipelines of the country last year.

Imagine what would be the effect if this crude had to be hauled and handled by rail. It would produce not a mere congestion but a crushing paralysis of traffic.

To move that much crude would require 160 trains of 60 cars each daily, added to our already congested traffic.

Furthermore, those trains would move only at the average railroad movement of freight—30 miles a day. The pipeline system moves crude at the rate of 4 miles an hour, 96 miles a day, more than three times the speed of the railroad.

To equal the delivery speed of the pipelines the railroads would have to put these trains on a fast schedule, like live stock trains, producing incalculable difficulties.

Efficiency in movement, however, is not the only achievement of the pipeline. If the railroads had had to move that crude they would have had to spend immense sums in providing tracks, terminals and tank cars. This investment would have been added to the cost of movement which the motorists would have had to pay when they bought their gasoline at the filling station.

The pipeline assumes all the hazards of transportation and the consignee is not billed for the crude until it is received at the refinery.

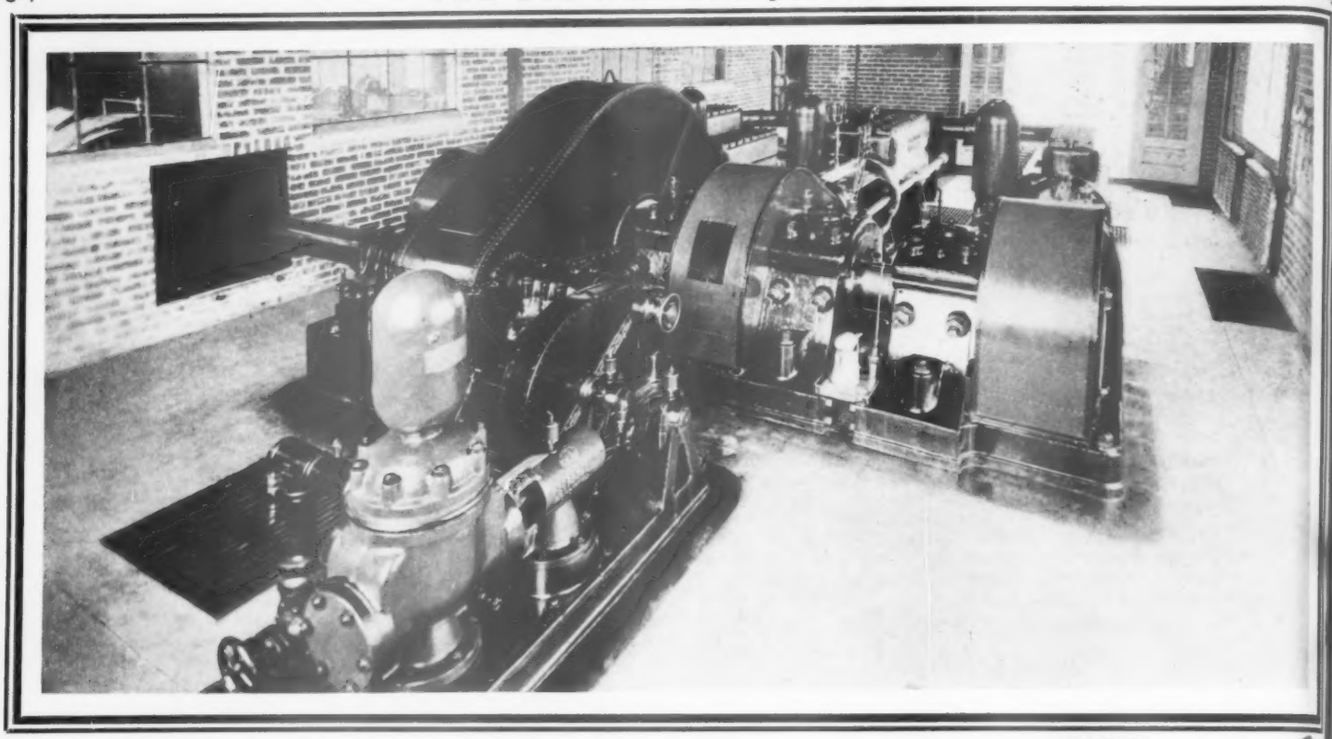
The pipeline companies and the crude oil purchasing companies protect the producers by providing disposal for their product, offering as it were, a warehouse system and relieving the producer of the problem of storage.

The consumer is assured a constant supply and the producer a safety valve that informs him of the conditions of the market and gives him a measure for the regulation of his activities.

But besides the $800,000,000 invested by the oil industry in pipelines and the quarter of a billion spent annually in extending and maintaining and operating them, it has spent $300,000,000 on tank cars, $450,000,000 on tankers, and $100,000,000 on tank trucks, a total of $1,650,000,000 representing the oil industry's efforts to maintain the most efficient transportation for its raw material and products.

In addition the petroleum industry ranks first among rail shippers of manufactures, the railroads handling a tonnage in refined petroleum products greater than their entire tonnage of bar and sheet iron, structural iron, iron pipe and pig and bloom iron. Yet 44 per cent of the refined oil products entering into domestic consumption do so without the use of the railroad, being handled by tank car and tank truck operated by the oil industry itself.

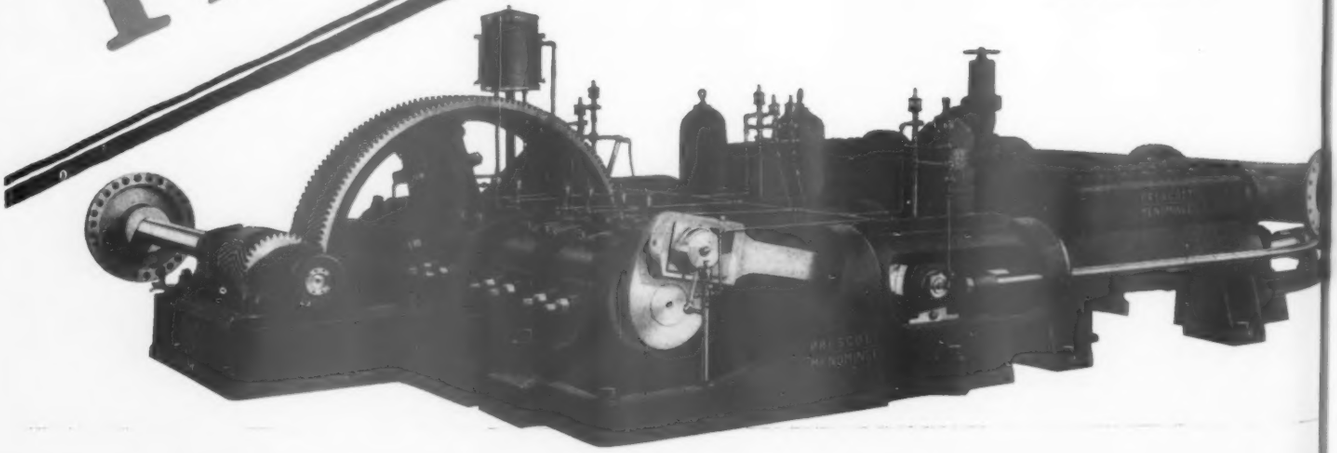
This issue of The Oil and Gas Journal, featuring the transportation of crude petroleum, is a tribute to an important and vital branch of the industry of which the public knows little and about which many in the industry ought to be informed.



A 25,000-barrel Prescott Pipe Line Pump at the Ralston, Oklahoma, station of the Oklahoma Pipe Line Company.

PRESCOTT PIPE

The Andian National Corporation, Limited, of Toronto, Canada, installed ten of these 30,000-barrel Prescott Pipe Line Pumps in Colombia, South America.



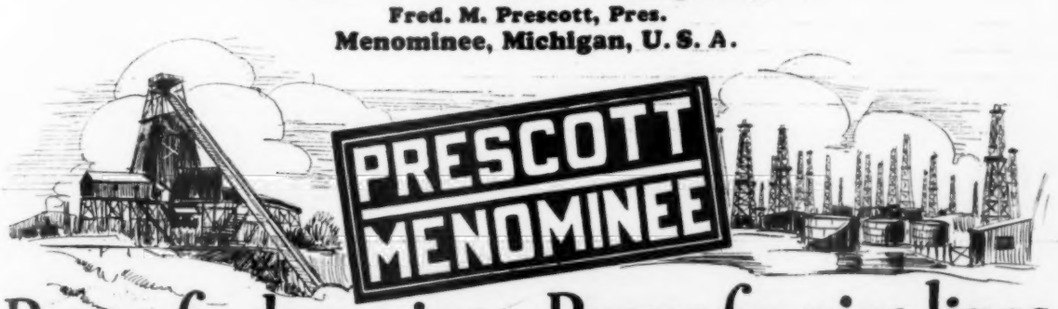
efficient powerful LINE PUMPS *reliable accessible*

PRESCOTT pumps keep the oil moving. Keep it moving day-in and day-out without interruptions for repairs or adjustments. These powerful, dependable pipe line pumps are built to take high pressures, to carry heavy overloads, to stand up to the hardest kind of continuous service. They do it *economically*. They operate with an unusual minimum of power.

The repeated preference of leaders in the industry for Prescott Pipe Line Pumps is recognition of Prescott performance.

A bulletin on request.

The Prescott Company
Fred. M. Prescott, Pres.
Menominee, Michigan, U. S. A.



Pumps for deep mines ~ Pumps for pipe lines

DEARBORN CHEMICAL COMPANY NO-OX-ID-IZED WRAPPER NEW YORK CHICAGO

NO-OX-IDized

Spiral Method

Quantities of No-Ox-Id and No-Ox-Idized Wrapper Per Mile

Spiral Method

Size of Pipe	Width of Lap	Width to Cut Strips	No. 100 Yard Bolts	Width Bolt	Lbs. NO-OX-ID
Two Inch	One half Inch	Two One-half Inch	Five	35 Inches	165
Three Inch	One half Inch	Three One-quarter Inch	Seven	35 Inches	225
Four Inch	One half Inch	Five One-seventh Inch	Eight	35 Inches	315
Six Inch	Three-quarter Inch	Seven One-fifth Inch	Ten and One-half	35 Inches	435
Eight Inch	Three-quarter Inch	Nine Inch	Fourteen	35 Inches	555
Ten Inch	Three-quarter Inch	Eleven One-half Inch	Sixteen One-half	35 Inches	750

Field labor costs on spiral wrapped pipe approximate 25% of the material cost.

Mechanically applied wrapping machines for municipal and extensive field application recommended.

Information on machines will be furnished on request.

Straight Way

No-Ox-Idized Wrapper and No-Ox-Id

For *Straight Way* laid on Welded or Screw Joint pipe per mile

Size of Pipe	3"	4"	6"	8"	10"
Width of Bolts	B32"	35"	26"	32"	40"
Multiple Cut	2	2	None	None	None
Longitudinal Lap	2"	2"	2"	2"	2"
Cross Lap	A2½"	A2"	A2"	A3"	A2½"
No. 100 Yard Bolts	C9	9	18	18	18
Pounds NO-OX-ID	225	315	435	555	750

A. Coupler Lap allowance.
B. Width for multiple furnished after Sept. 1, 1926, except 35".
C. Computed on basis of 1760 yards to mile. Length, width deducted to square yards.

NOTE—Welded pipe will take considerable less lap on cross lap owing to no coupler.

This method of application allows of rapid progress in wrapping pipe, as crew of ten men on larger sized with team will apply easily a mile per day. No cutting and fitting at joints or coupler as wrapper easily conforms to irregularities either coupler or fitting, making a neat and compact job. Costs approximately 4% of installation complete.

Chicago, 310 So. Michigan Ave. Dearborn Chic

DEARBORN CHEMICAL COMPANY NO-OX-ID-IZED WRAPPER NEW YORK CHICAGO

DEARBORN CHEMICAL COMPANY NO-OX-ID-IZED WRAPPER CHICAGO NEW YORK

Wrapper

Cross Lap

No-Ox-Idized Wrapper Dresser or Welded Pipe

Cross Lap Laid Method recommended for Pipe Sizes 12″-22″

Size Pipe		A 12″	B 14″	B 16″	B 18″	B 20″	B 22″
Width of Cuts		35″	35″	35″	35″	35″	35″
Length of Cuts		44″	48″	54″	60″	67″	73″
Longitudinal Lap		2″	2″	2″	2″	2″	2″
Cross Section Lap		4″	4″	4″	4″	4″	4″
No. 100 Yard Bolts	"C"	22½	24	27	30	33½	35½
Pounds NO-OX-ID	"D"	880	1095	1245	1365	1575	1650

A. Inside Diameter.
B. Outside Diameter.
C. Allowance for Dresser Coupling Cover.
D. Average temperature conditions spread per pound or gallon 130 to 160 square feet.

Cost per mile material and labor, 4½%, total costs of installation complete.

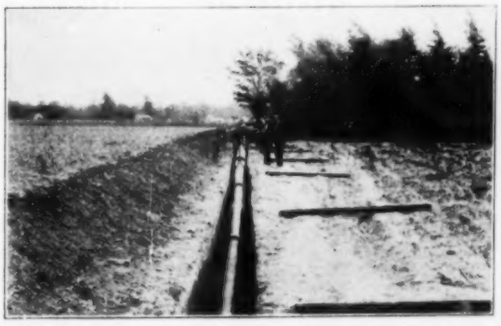
An insurance on your installation against deterioration.

Application

Applying NO-OX-ID to kill all pitting and corrosion that has started.

Showing NO-OX-ID-IZED Wrapper cut for application.

Mr. Cushing, Dearborn Service Engineer, rendering personal supervision — Dearborn Service accompanies Dearborn Products.



No more trouble with this line.

Chical Company 299 Broadway New York

DEARBORN CHEMICAL COMPANY NO-OX-ID-IZED WRAPPER CHICAGO NEW YORK

The Credit Sentry
of the Oil Fields

Resources Exceed
$45,000,000

The First Pipe Line

The first petroleum pipe line was bamboo, laid in Burma, but waste was so great that it was discarded quickly. In 1860 a proposal to lay a 6-inch iron pipe line from Burning Springs to Parkersburg, W. Va., was scoffed at as impractical. Two years later a short line was laid in New York. Oil was moved on the syphon principle. But again leakage was very great. Carefully fitted screw joints were adopted in 1865. There are now more than 50,000 miles of pipe lines in the United States gathering and transporting oil to the refining centers.

The First Bank

The Exchange National Bank of Tulsa was the first financial institution in the great Mid-Continent oil field to visualize the financial needs of the oil industry and to gather credit information for its customers. It is now generally referred to as "The Oil Bank of America." Standing preeminently in the center of things in the Mid-Continent district, this bank offers the fullest cooperation covering the entire field of financial service. It is worth a great deal to be a depositor with The Exchange National Bank of Tulsa.

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The EXCHANGE NATIONAL BANK

With which is Affiliated

Exchange NATIONAL BANK TRUST COMPANY TULSA

The Exchange Trust Company

The Oil Industry's Own Bank

The Largest Bank in Oklahoma

Why Oil Pipelines Are Constructed

They Form Part of a Business Already Established and Differ Greatly From Other Means of Transportation

By Andrew M. Rowley

oil pipeline system is a part of a ess already established. It differs any other transportation system in the product it transports, which is petroleum, must be available for ent before the line is constructed a market must be established for product before it can be accepted ransportation. It also differs from other transportation system in that peline, ordinarily, does not built up ess along the route it traverses and longer the line is in operation the business may be expected to be trans- by it. Every barrel of crude pe- m moved through the pipeline lea- just that much the quantity avail- for shipment through the line, con- ently the operation of a pipeline matically reduces the amount of busi- the line can expect to do in the re.

is th's feature of the oil pipeline ness which adds so much to the haz- of the pipeline companies. It must kept in mind that it costs between 000 and $20,000 a mile to build an ch main trunk line system, with p stations, and where a line ex- s a long d'stance, as do the trunk and lines serving large fields newly ed, the cost of these lines runs into y millions of dollars.

Railroads Have Advantage

railroad constructed into a new itory naturally attracts settlers along route, farms are developed, towns and es spring up and more and more busi- s is developed by the railroad as the ulation along the line increases with esultant gain in business for the rail- d in material and products carried o the new section and in the crops l products of the territory which be- e available for transportation to mar- s. In other words, the railroad aids tly in developing the country through ch it passes, thereby building up for lf a continually increasing business.

Even a log railroad, while somewhat ilar in the matter of possible business the time it is built to an oil pipeline, its great advantages over a pipeline so far as its future is concerned. A g road is built to bring timber from a tain section to markets just as an oil peline is constructed to carry crude from an oil field to refineries. When e timber is exhausted, the real purpose the log road has been served and the siness of the road, as far as the pri- ary purpose of its construction is con- ned, is over. However, from that int it differs from an oil pipeline. When e crude oil is exhausted in the field ved by the pipeline, the business of that peline is ended forever for nothing else n be carried in the line and oil once ken from the ground cannot be replaced. When a log road has served its pur- se, the ground through which it passes s been cleared of timber. That cleared ound naturally attracts settlers and e log road, in many instances, naturally avitates into a full fledged railroad ose business increases as the country comes more settled.

No Business Along Lines

Most of the oil trunk pipelines pass rough territory in which there are either oil fields nor refineries. These eas have no direct interest in the pipe- es. The lines do not add anything to e business of these sections and do not rry anything from these sections to arkets. As a result property owners d residents along the routes of these pelines view them more in the light an evil than as a benefit. They re- ive none of the benefits such as accrue from contact with a railroad; their products cannot be shipped through the pipelines; they cannot get articles by way of the pipelines such as they do by railroad; and quite often breaks occur in the pipelines resulting in damage to property and crops. Consequently, the pipeline companies and the officials representing them in areas such as these must be diplomats of the first order and experts in the matter of handling human nature in order to get the lines constructed in the first place and then to keep the line in operation without an endless amount of trouble and ill feeling with and on the part of property owners and residents along the lines.

Of course, there is one saving feature in this situation. It is the belief on the part of a majority of the farmers that their land contains oil. The famous "farmer's sand" is a reality as far as they are concerned and almost every owner of property believes absolutely there is oil under his land and that some day someone will drill a well on the property and get a gusher. Naturally, a pipeline through his property will facilitate matters when this gusher is drilled and the farmer will have access to markets at once when he gets the crude. Oil men may smile at this but the men working for the pipeline companies who are forced to deal with these farmers realize the importance of this feeling.

New Field Must Be Studied

There seems to be a widespread feeling, even among men connected with the petroleum industry, that the minute a new oil field is discovered, regardless of its location, every pipeline company should immediately be very anxious to lay a line to that field. The Texas Panhandle Field is a shining example. Producing companies were spending millions of dollars for leases and equipment to drill wells. There were nearly 200 producing wells in the field and the daily output averaged around 50,000 bbls. with 200 more tests drilling and having good prospects of becoming producers. Yet there was not a pipeline to the field and the industry kept wondering when a pipeline would be built.

The pipeline companies, however, could not afford to be carried away by the excitement attending the development of the field. Officials of the different companies made numerous trips to the field, viewing the situation from the many angles involved in the pipeline business. They not only had to gauge accurately conditions in the Panhandle area as they existed during the boom but they had to figure as best they could the probable ultimate recovery of crude oil and what part of this crude would be available for shipment through a pipeline if the line were constructed.

Factors Involved in Decision

Before deciding to construct a pipeline which would cost approximately $4,000,000, the pipeline company must be assured of adequate business over a comparatively long period of time to insure a return on this investment. There must be a large quantity of crude oil in storage in the field, ready and available for immediate shipment through the pipeline. There must be enough production in the field to guarantee future business for the pipeline and the nature of the wells producing must be such as to indicate they would not be short lived. Also, development of the area must be on such a scale as to give promise of maintaining production.

Oil fields are prone to enjoy a season of unusually active development with a big flush production, and, some at least, decline as quickly or more rapidly, than they rise. When a pipeline company builds a line to such a field, it takes a big chance of losing considerable money for the transportation of crude must extend over a long period to bring a return on the money invested in the line. The line can carry only so much crude a day at so much a barrel.

Having determined in their own minds the questions relating to production, future development, probable ultimate recovery and what crude likely would be available for shipment through the line, if built, the pipeline company officials then had to work on the other end of the line. It would be useless to build the line even though there were a vast quantity of crude to be shipped if there were no buyers to accept this crude. These buyers, who form the market for the product transported through the pipeline, really determine the location of the terminal of the line away from the field. That is the reason every pipeline company cannot construct a line to a certain field, or to the Texas Panhandle which is cited as an example.

Requirements of Customers

For instance, the Prairie Pipe Line Co.'s main trunk lines extend to Wood River, Ill., and Whiting, Ind. It passes through Neodesha, Kans., and other points but at the three points mentioned are located the largest refineries, the Standard of Indiana having a big refinery at Whiting, the Roxana Petroleum Corp., a large plant at Wood River and the Standard Oil Co. of Kansas a good-sized refinery at Neodesha. Now suppose the Prairie would build a line to the Texas Panhandle and these three big customers did not desire Texas Panhandle crude. The Prairie could not ship crude

(Continued on Page C-190)

Pipeline Companies Deserve Credit

This week's Oil and Gas Journal, devoted to crude oil transportation in North America, which we are confident is the most comprehensive and accurate compilation of data relating to oil pipelines ever published before by any company, organization or government bureau, was made possible through the hearty and active co-operation of the various pipeline companies and the different officials of these companies. The Oil and Gas Journal at this time desires to express its whole-hearted and sincere thanks and appreciation for the assistance rendered it by the pipeline companies and the individual officials and heads of departments and to share with these companies and officials whatever credit may accrue from the presentation for the first time in the history of the petroleum industry of a complete, detailed and illustrated story of the great work being done by the pipeline industry both for the benefit of the petroleum industry and for the general public.

To name the companies assisting in preparing the data contained in this insert would be to give a roster of the pipeline industry of the nation. Not only was the home office of The Oil and Gas Journal at Tulsa offered every facility for obtaining whatever information, pictures or other data it desired by the various companies in the Mid-Continent area, but the staff correspondents of this publication in the different fields of the country met with the same spirit of co-operation and assistance.

It was the desire of The Oil and Gas Journal to present in one issue all pertinent data bearing upon the construction, operation and service of a pipeline in order that this vitally important branch of the petroleum industry might receive, in some measure, credit for the wonderful work it performs 24 hours a day in making gasoline and other petroleum products the cheapest of all commodities and bringing them to every crossroads in the nation. Never before has this branch of the petroleum industry been featured as in this issue. The public has been kept informed regarding big gushers and has been taught a great deal about gasolines and motor oils but little has ever been said before as to how the crude from the big gusher is transported to the refinery, finally to be sold to the motorist as gasoline or motor oil.

Constructing an Oil Pipe Line Syste

Vast Amount of Work Involved and Material Required in Connecting Producing Fields With Crude Oil Markets

(Furnished by the Sinclair Pipe Line Co.)

A pipeline system is built progressively as the development of the new oil fields necessitates the extension of the lines. The great trunk line systems of today are an outgrowth of the small pipeline systems which were built to supply the local refineries with oil from the surrounding oil fields. But the extension of the oil fields into the more remote places, and the building of refineries at points distant from the oil fields have brought about the trunk line systems that have been built over a period of years. These systems are always changing—lines are being taken up and stations are being abandoned while at other places, lines are being laid and pumping stations are being built. Unlike the railroads, the pipeline systems are undergoing continuous changes at considerable expense. From time to time it is necessary for the pipeline companies to increase the capacity of their systems or to extend the trunk lines; it is the purpose of this paper to describe such an extension.

Organizing for the Construction Work

Preliminary to the building of a long pipeline, considerable organization and design work must be carried out to insure the efficient and economical construction of the system. Before any construction work is done the personnel of the general office is instructed and the construction program is outlined. The engineering department is instructed to make a survey and to prepare designs for the construction work. The purchasing agent organizes a staff to care for the increased purchases and the auditor sets up new records for the construction work. The traffic and transportation departments are instructed to see that material is properly dispatched and distributed. The materials department is made responsible for the receipt and the proper disposition of the material. As a rule contracts are let for the construction of the line, and inspectors are chosen to see that the contracts are properly fulfilled. Construction superintendents are chosen for each class of work. During a construction program, it is customary to have the construction work and the operation managed under separate supervision.

The Pipeline Is Designed

The designing of a pipeline system becomes a very complex problem when a viscous oil must be transported through the pipeline. The powerful pumps which are located at the pumping stations force the oil through the lines but there is a limit to the pressure which can be carried by the pumps and the pipe. In forcing the oil through the lines very high pressures are encountered due to the friction of the oil moving through the pipe. The pressure that is built up in a line depends largely on the rate that the oil is being moved through the line, also the viscosity and the density of the fluid are determining factors. It might be explained here that viscosity is a name given to that property of a fluid which influences its flow; thus it is said that molasses is more viscous than water, or has a higher viscosity. Because there are many varieties of crude oil that vary widely in viscosity it becomes necessary first in designing a pipeline to make a thorough study of the character of the crude oil that is to be transported; for it is known that at moderate temperatures some crude oils with a high paraffin content will flow easily, but when they are chilled it is difficult to pump them through the pipelines. Thus in considering the design of a trunk line system, it is desirable to learn what grades of crude oil will have to be handled through the pipeline and then the characteristics of each should be studied. Typical samples are obtained and the density of the oils are determined as well as the viscosities at various temperatures within range of the oil temperature in the pipeline. With these data, along with the information supplied by the engineers' survey of the course of the line the pipeline is designed by hydraulic formulas.

Size of Lines and Location of Stations

After the characteristics of the crude oil have been determined, it is necessary to know something about the topography of the country through which the line is to pass. The course of the line is determined and the elevations along it are obtained. From this information, a profile is made. The viscosity data and the figures on the desired rate of pumping are used in conjunction with the profile to determine the size of the line required and the distance the stations should be located apart. In the case of the lighter crude oils, such as those handled in the Mid-Continent region, stations are located 35 to 40 miles apart, and pipelines varying in diameter from 8 to 12 inches are laid. It is customary to lay a smaller line on the high pressure end, say an 8 or 10-inch line on the high pressure end and a 10 or 12-inch line on the low pressure end. This is done so that the smaller lines will carry the high pressures to such a point as it will be safe to make use of the larger pipe. When additional capacity in a pipeline is desired, it is general practice to loop the smaller lines on the high pressure end. Of course the use of the smaller lines near the station permits the carrying of higher pressures.

The course of the pipeline is chosen first.

Motive Power Is Chosen

After the size of the lines and the distance between the stations have been decided, the size of the pumps is next determined and the horsepower of the engines is computed. In the use of the Diesel engine, 3 per cent is lost in horsepower for each 1,000 feet of elevation above sea level; thus for 5,000 feet above sea level an engine having 15 per cent greater horsepower than required at sea level is purchased.

Survey Is Made

Preceding the construction of a pipeline system, a survey is made to determine the course the line should take. Terminal points are decided upon, and it is the purpose of the survey to choose a most direct course between the terminal points; to keep the line free from hazards; to eliminate as many river and creek crossings as possible and to choose a course that will not pass the line through cities, towns or densely populated areas. It is the purpose of the survey to choose a most direct and a most desirable course. Along with the choosing of a course for the line the engineers obtain elevation data for the profile which is used in determining the elevations to be pumped against, also for plotting a hydraulic gradient.

Pumping Station Sites

Along the course of this line pumping station sites will be chosen at distances according to the design of the system. The station site will be chosen, first according to the distance between the stations, with such conditions influencing it as its proximity to railroads, roads and other means of transportation for bringing in the material and equipment, location near towns, desirability of tract as to drainage, the cost of the land, the availability of water and the desirability of the location. It is impossible to locate a station always where the design would call for it, because of these factors that influence it. The location of the proposed site might not be desirable on account of the cost to clear the land of timber and undergrowth or possibly poor drainage. And the location might be too far distant from transportation facilities. Thus it is necessary to vary the distances between the stations slightly on account of topographical features and the factors influencing the choice of a station site. It is usual practice to buy a fairly large tract of land for a station site when the initial purchase is made to permit the spacing of the tanks and pumping station at good distances apart, and to provide room for reasonable additions to the pumping station. The important factor in the choosing of a station site is the proximity to transportation facilities, because where a great deal of tonnage must be handled, as in the case of the construction of pumping stations, transportation charges cover a very material item of the construction cost.

Maps Are Made and the Right of Way Is Purchased

After the course of the line has been determined, the pumping stations have been located and the tank farm sites purchased, the next procedure is to obtain the right of way. To aid in the purchase of the right of way and to assist in the construction of the line, maps of the survey have been made by the engineering department, showing landowners, the roadage on each farm, railroads, rivers, creeks, towns, and possibly a description of the land through which the line passes. Such right of way is bought outright for the present line, for its possible future development, telegraph and telephone system where possible, and the rights and permission to construct and operate the line through the land which it must pass. Very often it is not possible to obtain the right of way for telegraph and telephone lines along the same course as the pipeline, because telephone poles are an obstruction to farming, and in such cases the telephone and telegraph line is diverted from the course of the pipeline to join it at some further point and parallel it.

It is the policy of most pipeline companies to obtain the right of way without condemning any land, making the purchase at a fair price by agreement.

Course of the Line Is Staked by Engineers

After the engineering department has definitely chosen the course of the line, stakes are set and numbered along the course of the line so that the material can be properly distributed along it.

Clearing a pipeline right of way through a swamp.

the progress of each phase of the construction work can be reported by number to the general office, where the progress of the work is watched from chart.

Right of Way

As soon as the right of way is cleared a crew of men is organized to go ahead of the construction crews to remove obstacles in the course of the line, such as timber, undergrowth, etc., and to grade such points along the line so that the pipe-screwing machines and ditching machines, as well as the construction crews can move along without delay as difficult points are reached.

Transporting the Material and Stringing

The steel companies have been instructed to ship the pipe to designated railroad points, which are nearest the course of the pipeline. When the pipe

The pipe is received at the nearest railroad points along course of pipeline

received it is unloaded at these various points and hauled by truck to points along the pipeline; from these points the pipe is strung along the course of the line by teams, trucks or man power. At the stakes, which have been set by the engineers in the course of the line, the pipe is distributed in a long string so that it is convenient for the construc

to use the pipe as it is required. hauling and the stringing of the is done usually by a contract. Some- s a contract is let to one firm to the line, and the contractor sub- the hauling of the pipe, stringing of pipe, ditching, backfilling, etc.

Transportation Difficulties

ue to the fact that a pipeline takes ther direct course, it passes very en through sections of the country re there are few or no roads, and transporting of the material to the

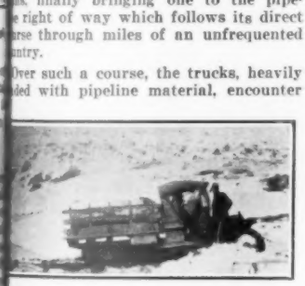
The pipe is hauled in and strung along the course of the pipeline.

line becomes a real problem. In the nnaissance survey of the engineers, ils and roads leading to the pipeline t of way are chosen. At some points pipeline may be as far as 40 or e miles away from the railroad point ere the pipeline material is received. se trails leave the highway and have ther nondescript course to the pipe- ; they pass through farm land, along es, across open prairies, through can- , up and down steep grades, along slopes of hills that are too steep to h, zigzagging as the go, through en hewn across dense timber land, ss creeks and over hills and moun-

Hauling heavy engine parts over a long distance to a pumping station, which is being constructed.

ns, finally bringing one to the pipe- right of way which follows its direct rse through miles of an unfrequented ntry.

Over such a course, the trucks, heavily ded with pipeline material, encounter



Truck, heavily loaded with pipeline material, stuck in a creek crossing along one of nondescript pipeline trails.

y difficulties, and the transportation blem is a real one. For this reason pipeline company endeavors to have

Pipeline truck trying to make emergency trip of 40 miles over snow-bound trail that follows high points of rolling land.

material moved in over these trails en the weather conditions are best.

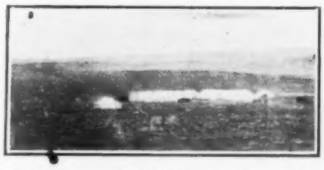
Pipeline Camps

Before the construction of a pipeline ins, camps will be established along line to house and feed the men em- ed in the construction crew. A camp be established and maintained in one place as long as the distance the men must be hauled to work by truck is not greater than 5 miles. As the building of the pipeline progresses the camp is moved ahead of the crew 4 or 5 miles. Along the line there will be a number of camps depending upon the number of crews at work. Along any one section of the line, there may be a camp for the ditching crew, one for the men who are laying the line, and possibly a camp for the men who are doping the pipeline.

Due to the temporary character of these pipeline camps, tents are used entirely. One of these pipeline camps will consist of a "mess house," the "high pressure" quarters, the commissary tent, and the sleeping quarters for the men.

The "mess house" is a long tent which covers the kitchen and the dining room. As a rule there is only the earthen floor in this place as well as in the sleeping quarters. Except for its temporary character, the kitchen differs little from that of any other camp kitchen. In the dining room there are usually two tables, 30 to 40 feet long, with an aisle between them for serving the food. Attached to the tables are benches. The tables are covered with oilcloth and as a rule tin and enameled dishes are used.

In a pipeline camp there will be from 50 to 100 men, and when there is not enough room to serve all of these men at one time, the tables are cleared and prepared for those who must wait for the second table. Breakfast and supper are served in the camp, but the noon meal is taken to the men by a truck in case they are too far from the camp. It might be mentioned here that this noon meal is not a cold lunch; for pipeliners cannot live on such a fare. On the contrary a hot meal is taken out to the men.



Pipeline camp, isolated in an unfrequented country.

The different kinds of food are put in two or three-gallon pails and taken out to the place where the men are working. The buckets are set in a row, and the men who are given tin plates, cups, knives, spoons and forks, pass by the buckets and help themselves to the various foods. Of course a good supply of hot coffee and canned milk has been brought also. Pie or cake is a part of this meal, too. Breakfast and supper at pipeline camps are real meals; of course they are not prepared with much style, but there is always an abundance of good food on the table. The men must have good food and plenty of it for their work uses up much of their energy. The cook, who is assisted by "flunkies," sees that the food is properly prepared and served.

The "high pressure" tent is the headquarters of the camp, and it is here that the construction foremen and the timekeepers make their headquarters. The official business of the camp is carried on here.

In the sleeping quarters of the men there are about 20 cots which are arranged on either side of the tent with an aisle between them. The cots are provided with a mattress and blankets, but sheets are almost out of the question. The sleeping quarters are under the care of the "crumb boss," who is responsible for the cleanliness of the place.

The water supply for such a camp is usually hauled a long distance by team or truck; for a water supply is rarely available near the pipeline camps.

On a job of this kind there it little to do besides working, eating and sleeping, and being isolated the men find recreation in cards, dice and telling stories.

Welding a pipeline by the oxygen-acetylene method.

Laying the Line

Pipelines are connected either by welding or screwing. In the case of the welding, line pipe is purchased in lengths of about 20 feet and welded into joints of 40 feet along the pipeline right of way; following the men who weld the two joints together are other welders who connect the pipe in the line by further welding. These welds may be made either by the electrical or oxygen-acetylene method; the latter method is generally used, and acetylene generators are strung along the section of the line that is being constructed. Oxygen cylinders are strung along the line also, and the oxygen is used as it is needed. The welding of pipelines requires careful workmanship and skilled men.

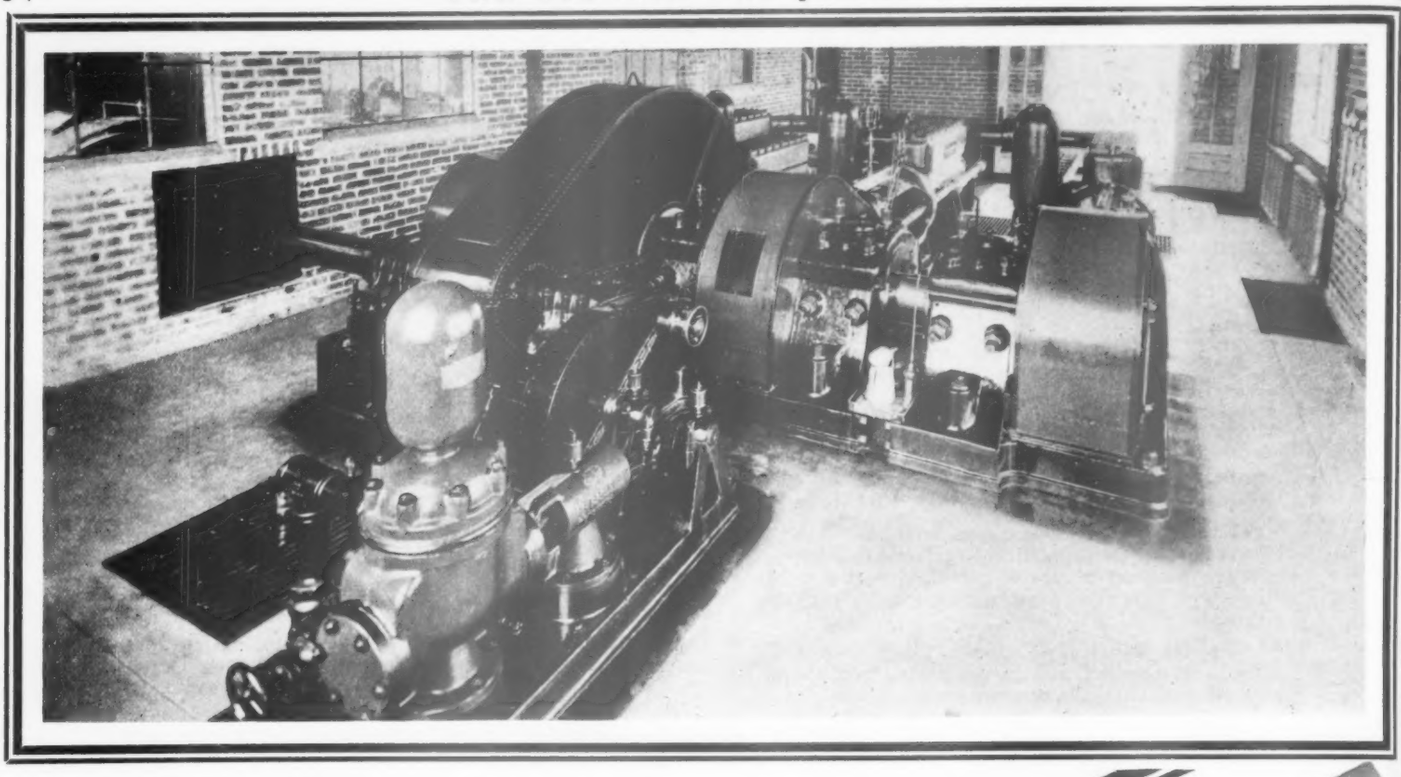
In the case of the screwed line, the pipe is strung with a coupling on one end, a thread protector on the other end. The line is laid either by hand or machine. The more recent practice on trunk lines is to lay the line by the machine, except in places where it is impossible for the machine to operate. After the pipe has been strung the thread protectors are removed as the pipe is screwed into the line. Each joint of pipe is supposed to be swabbed out to remove anything that might obstruct the line. At the end of each working day the line is closed with a bull plug to prevent wild animals entering it. The line is screwed together as the machine progresses along the course, and about 40 to 60 men are required in the crew in this type of construction. In the case of the hand-laid pipe, 50 to 100 men are required to carry out the various duties, when laying 8 to 12-inch lines. For a long time there was considerable prejudice against the pipeline laid by machine, but the machine-laid lines have proved satisfactory, and the use of the machine is an efficient and economical way of laying a line.

Laying pipelines by hand.

A pipeline right of way through a rough and broken country. The pipeline is ready to be lowered into the ditch.

Ditching

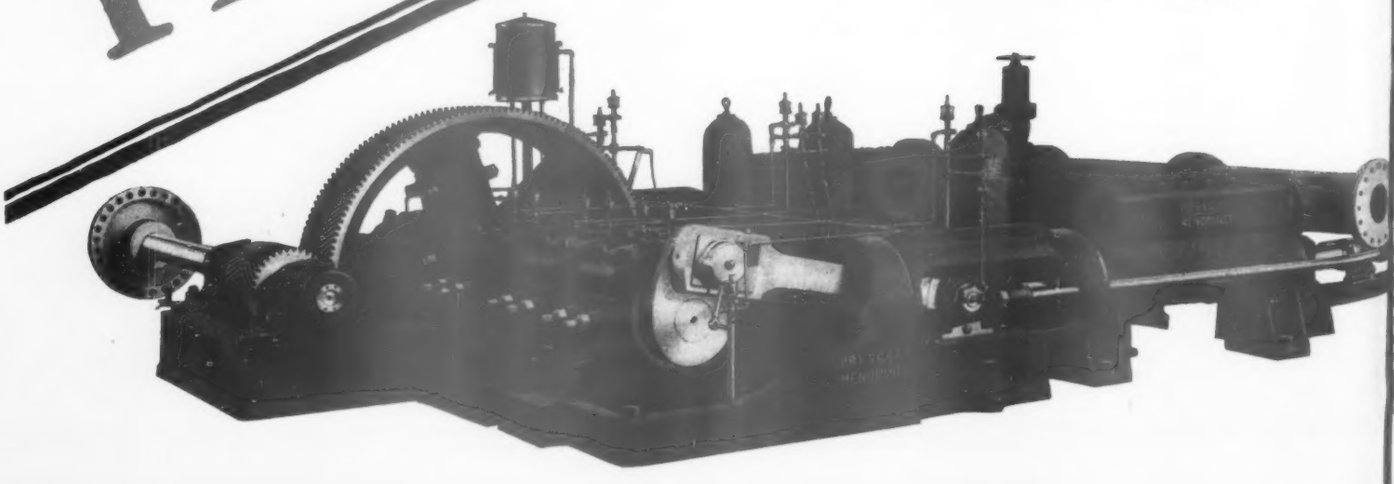
The pipeline is screwed and laid and following the pipe-laying machine is the ditching machine which digs a ditch wide enough and deep enough to care for the pipe, allowing 18 inches to 2 feet for the line to lay below the surface of the ground. Only a few men are required in this ditching work. The ditching machine travels along the ground as a tractor; but there are places where it can not go—then it is necessary to do the ditching by hand. In case rock is encountered,



A 25,000-barrel Prescott Pipe Line Pump at the Ralston, Oklahoma, station of the Oklahoma Pipe Line Company.

PRESCOTT PIPE

The Andian National Corporation, Limited, of Toronto, Canada, installed ten of these 30,000-barrel Prescott Pipe Line Pumps in Colombia, South America.



Why Oil Pipelines Are Constructed

They Form Part of a Business Already Established and Differ Greatly From Other Means of Transportation

By Andrew M. Rowley

An oil pipeline system is a part of a business already established. It differs from any other transportation system in that the product it transports, which is crude petroleum, must be available for shipment before the line is constructed and a market must be established for this product before it can be accepted for transportation. It also differs from any other transportation system in that a pipeline, ordinarily, does not built up business along the route it traverses and the longer the line is in operation the less business may be expected to be transacted by it. Every barrel of crude petroleum moved through the pipeline lessens just that much the quantity available for shipment through the line, consequently the operation of a pipeline automatically reduces the amount of business the line can expect to do in the future.

It is this feature of the oil pipeline business which adds so much to the hazards of the pipeline companies. It must be kept in mind that it costs between $19,000 and $20,000 a mile to build an 8-inch main trunk line system, with pump stations, and where a line extends a long distance, as do the trunk lines and lines serving large fields newly opened, the cost of these lines runs into many millions of dollars.

Railroads Have Advantage

A railroad constructed into a new territory naturally attracts settlers along its route, farms are developed, towns and cities spring up and more and more business is developed by the railroad as the population along the line increases with a resultant gain in business for the railroad in material and products carried into the new section and in the crops and products of the territory which become available for transportation to markets. In other words, the railroad aids greatly in developing the country through which it passes, thereby building up for itself a continually increasing business.

Even a log railroad, while somewhat similar in the matter of possible business at the time it is built to an oil pipeline, has its great advantages over a pipeline in so far as its future is concerned. A log road is built to bring timber from a certain section to markets just as an oil pipeline is constructed to carry crude oil from an oil field to refineries. When the timber is exhausted, the real purpose of the log road has been served and the business of the road, as far as the primary purpose of its construction is concerned, is over. However, from that point it differs from an oil pipeline. When the crude oil is exhausted in the field served by the pipeline, the business of that pipeline is ended forever for nothing else can be carried in the line and oil once taken from the ground cannot be replaced.

When a log road has served its purpose, the ground through which it passes has been cleared of timber. That cleared ground naturally attracts settlers and the log road, in many instances, naturally gravitates into a full fledged railroad whose business increases as the country becomes more settled.

No Business Along Lines

Most of the oil trunk pipelines pass through territory in which there are neither oil fields nor refineries. These areas have no direct interest in the pipelines. The lines do not add anything to the business of these sections and do not carry anything from these sections to markets. As a result property owners and residents along the routes of these pipelines view them more in the light of an evil than as a benefit. They receive none of the benefits such as accrue from contact with a railroad; their products cannot be shipped through the pipelines; they cannot get articles by way of the pipelines such as they do by railroad; and quite often breaks occur in the pipelines resulting in damage to property and crops. Consequently, the pipeline companies and the officials representing them in areas such as these must be diplomats of the first order and experts in the matter of handling human nature in order to get the lines constructed in the first place and then to keep the line in operation without an endless amount of trouble and ill feeling with and on the part of property owners and residents along the lines.

Of course, there is one saving feature in this situation. It is the belief on the part of a majority of the farmers that their land contains oil. The famous "farmer's sand" is a reality as far as they are concerned and almost every owner of property believes absolutely there is oil under his land and that some day someone will drill a well on the property and get a gusher. Naturally, a pipeline through his property will facilitate matters when this gusher is drilled and the farmer will have access to markets at once when he gets the crude. Oil men may smile at this but the men working for the pipeline companies who are forced to deal with these farmers realize the importance of this feeling.

New Field Must Be Studied

There seems to be a widespread feeling, even among men connected with the petroleum industry, that the minute a new oil field is discovered, regardless of its location, every pipeline company should immediately be very anxious to lay a line to that field. The Texas Panhandle Field is a shining example. Producing companies were spending millions of dollars for leases and equipment to drill wells. There were nearly 200 producing wells in the field and the daily output averaged around 50,000 bbls. with 200 more tests drilling and having good prospects of becoming producers. Yet there was not a pipeline to the field and the industry kept wondering when a pipeline would be built.

The pipeline companies, however, could not afford to be carried away by the excitement attending the development of the field. Officials of the different companies made numerous trips to the field, viewing the situation from the many angles involved in the pipeline business. They not only had to gauge accurately conditions in the Panhandle area as they existed during the boom but they had to figure as best they could the probable ultimate recovery of crude oil and what part of this crude would be available for shipment through a pipeline if the line were constructed.

Factors Involved in Decision

Before deciding to construct a pipeline which would cost approximately $4,000,000, the pipeline company must be assured of adequate business over a comparatively long period of time to insure a return on this investment. There must be a large quantity of crude oil in storage in the field, ready and available for immediate shipment through the pipeline. There must be enough production in the field to guarantee future business for the pipeline and the nature of the wells producing must be such as to indicate they would not be short lived. Also, development of the area must be on such a scale as to give promise of maintaining production.

Oil fields are prone to enjoy a season of unusually active development with a big flush production, and, some at least, decline as quickly or more rapidly, than they rise. When a pipeline company builds a line to such a field, it takes a big chance of losing considerable money for the transportation of crude must extend over a long period to bring a return on the money invested in the line. The line can carry only so much crude a day at so much a barrel.

Having determined in their own minds the questions relating to production, future development, probable ultimate recovery and what crude likely would be available for shipment through the line, if built, the pipeline company officials then had to work on the other end of the line. It would be useless to build the line even though there were a vast quantity of crude to be shipped if there were no buyers to accept this crude. These buyers, who form the market for the product transported through the pipeline, really determine the location of the terminal of the line away from the field. That is the reason every pipeline company cannot construct a line to a certain field, or to the Texas Panhandle which is cited as an example.

Requirements of Customers

For instance, the Prairie Pipe Line Co.'s main trunk lines extend to Wood River, Ill., and Whiting, Ind. It passes through Neodesha, Kans., and other points but at the three points mentioned are located the largest refineries, the Standard of Indiana having a big refinery at Whiting, the Roxana Petroleum Corp., a large plant at Wood River and the Standard Oil Co. of Kansas a good-sized refinery at Neodesha. Now suppose the Prairie would build a line to the Texas Panhandle and these three big customers did not desire Texas Panhandle crude. The Prairie could not ship crude

(Continued on Page C-190)

Pipeline Companies Deserve Credit

This week's Oil and Gas Journal, devoted to crude oil transportation in North America, which we are confident is the most comprehensive and accurate compilation of data relating to oil pipelines ever published before by any company, organization or government bureau, was made possible through the hearty and active co-operation of the various pipeline companies and the different officials of these companies. The Oil and Gas Journal at this time desires to express its whole-hearted and sincere thanks and appreciation for the assistance rendered it by the pipeline companies and the individual officials and heads of departments and to share with these companies and officials whatever credit may accrue from the presentation for the first time in the history of the petroleum industry of a complete, detailed and illustrated story of the great work being done by the pipeline industry both for the benefit of the petroleum industry and for the general public.

To name the companies assisting in preparing the data contained in this insert would be to give a roster of the pipeline industry of the nation. Not only was the home office of The Oil and Gas Journal at Tulsa offered every facility for obtaining whatever information, pictures or other data it desired by the various companies in the Mid-Continent area, but the staff correspondents of this publication in the different fields of the country met with the same spirit of co-operation and assistance.

It was the desire of The Oil and Gas Journal to present in one issue all pertinent data bearing upon the construction, operation and service of a pipeline in order that this vitally important branch of the petroleum industry might receive, in some measure, credit for the wonderful work it performs 24 hours a day in making gasoline and other petroleum products the cheapest of all commodities and bringing them to every crossroads in the nation. Never before has this branch of the petroleum industry been featured as in this issue. The public has been kept informed regarding big gushers and has been taught a great deal about gasolines and motor oils but little has ever been said before as to how the crude from the big gusher is transported to the refinery, finally to be sold to the motorist as gasoline or motor oil.

Constructing an Oil Pipe Line System

Vast Amount of Work Involved and Material Required in Connecting Producing Fields With Crude Oil Markets

(Furnished by the Sinclair Pipe Line Co.)

A pipeline system is built progressively as the development of the new oil fields necessitates the extension of the lines. The great trunk line systems of today are an outgrowth of the small pipeline systems which were built to supply the local refineries with oil from the surrounding oil fields. But the extension of the oil fields into the more remote places, and the building of refineries at points distant from the oil fields have brought about the trunk line systems that have been built over a period of years. These systems are always changing—lines are being taken up and stations are being abandoned while at other places, lines are being laid and pumping stations are being built. Unlike the railroads, the pipeline systems are undergoing continuous changes at considerable expense. From time to time it is necessary for the pipeline companies to increase the capacity of their systems or to extend the trunk lines; it is the purpose of this paper to describe such an extension.

Organizing for the Construction Work

Preliminary to the building of a long pipeline, considerable organization and design work must be carried out to insure the efficient and economical construction of the system. Before any construction work is done the personnel of the general office is instructed and the construction program is outlined. The engineering department is instructed to make a survey and to prepare designs for the construction work. The purchasing agent organizes a staff to care for the increased purchases and the auditor sets up new records for the construction work. The traffic and transportation departments are instructed to see that material is properly dispatched and distributed. The materials department is made responsible for the receipt and the proper disposition of the material. As a rule contracts are let for the construction of the line, and inspectors are chosen to see that the contracts are properly fulfilled. Construction superintendents are chosen for each class of work. During a construction program, it is customary to have the construction work and the operation managed under separate supervision.

The Pipeline Is Designed

The designing of a pipeline system becomes a very complex problem when a viscous oil must be transported through the pipeline. The powerful pumps which are located at the pumping stations force the oil through the lines but there is a limit to the pressure which can be carried by the pumps and the pipe. In forcing the oil through the lines very high pressures are encountered due to the friction of the oil moving through the pipe. The pressure that is built up in a line depends largely on the rate that the oil is being moved through the line, also the viscosity and the density of the fluid are determining factors. It might be explained here that viscosity is a name given to that property of a fluid which influences its flow; thus it is said that molasses is more viscous than water, or has a higher viscosity. Because there are many varieties of crude oil that vary widely in viscosity it becomes necessary first in designing a pipeline to make a thorough study of the character of the crude oil that is to be transported; for it is known that at moderate temperatures some crude oils with a high paraffin content will flow easily, but when they are chilled it is difficult to pump them through the pipelines. Thus in considering the design of a trunk line system, it is desirable to learn what grades of crude oil will have to be handled through the pipeline and then the characteristics of each should be studied. Typical samples are obtained and the density of the oils are determined as well as the viscosities at various temperatures within range of the oil temperature in the pipeline. With these data, along with the information supplied by the engineers' survey of the course of the line the pipeline is designed by hydraulic formulas.

Size of Lines and Location of Stations

After the characteristics of the crude oil have been determined, it is necessary to know something about the topography of the country through which the line is to pass. The course of the line is determined and the elevations along it are obtained. From this information, a profile is made. The viscosity data and the figures on the desired rate of pumping are used in conjunction with the profile to determine the size of the line required and the distance the stations should be located apart. In the case of the lighter crude oils, such as those handled in the Mid-Continent region, stations are located 35 to 40 miles apart, and pipelines varying in diameter from 8 to 12 inches are laid. It is customary to lay a smaller line on the high pressure end, say an 8 or 10-inch line on the high pressure end and a 10 or 12-inch line on the low pressure end. This is done so that the smaller lines will carry the high pressures to such a point as it will be safe to make use of the larger pipe. When additional capacity in a pipeline is desired, it is general practice to loop the smaller lines on the high pressure end. Of course the use of the smaller lines near the station permits the carrying of higher pressures.

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Preceding the construction of a pipeline system, a survey is made to determine the course the line should take. Terminal points are decided upon, and it is the purpose of the survey to choose a most direct course between the terminal points; to keep the line free from hazards; to eliminate as many river and creek crossings as possible and to choose a course that will not pass the line through cities, towns or densely populated areas. It is the purpose of the survey to choose a most direct and a most desirable course. Along with the choosing of a course for the line the engineers obtain elevation data for the profile which is used in determining the elevations to be pumped against, also for plotting a hydraulic gradient.

Pumping Station Sites

Along the course of this line pumping station sites will be chosen at distances according to the design of the system. The station site will be chosen, first according to the distance between the stations, with such conditions influencing it as its proximity to railroads, roads and other means of transportation for bringing in the material and equipment, location near towns, desirability of tract as to drainage, the cost of the land, the availability of water and the desirability of the location. It is impossible to locate a station always where the design would call for it, because of these factors that influence it. The location of the proposed site might not be desirable on account of the cost to clear the land of timber and undergrowth or possibly poor drainage. And the location might be too far distant from transportation facilities. Thus it is necessary to vary the distances between the stations slightly on account of topographical features and the factors influencing the choice of a station site. It is usual practice to buy a fairly large tract of land for a station site when the initial purchase is made to permit the spacing of the tanks and pumping station at good distances apart, and to provide room for reasonable additions to the pumping station. The important factor in the choosing of a station site is the proximity to transportation facilities, because where a great deal of tonnage must be handled, as in the case of the construction of pumping stations, transportation charges cover a very material item of the construction cost.

Maps Are Made and the Right of Way Is Purchased

After the course of the line has been determined, the pumping stations have been located and the tank farm sites purchased, the next procedure is to obtain the right of way. To aid in the purchase of the right of way and to assist in the construction of the line, maps of the survey have been made by the engineering department, showing landowners, the roadage on each farm, railroads, rivers, creeks, towns, and possibly a description of the land through which the line passes. Such right of way is bought outright for the present line, for its possible future development, telegraph and telephone system where possible, and the rights and permission to construct and operate the line through the land which it must pass. Very often it is not possible to obtain the right of way for telegraph and telephone lines along the same course as the pipeline, because telephone poles are an obstruction to farming, and in such cases the telephone and telegraph line is diverted from the course of the pipeline to join it at some further point and run parallel it.

It is the policy of most pipeline companies to obtain the right of way without condemning any land, making the purchase at a fair price by agreement.

Course of the Line Is Staked by the Engineers

After the engineering department has definitely chosen the course of the line, stakes are set and numbered along the course of the line so that the material can be properly distributed along it as the progress of each phase of the construction work can be reported by station number to the general office, where the progress of the work is watched from a chart.

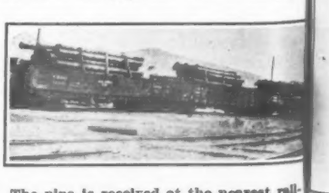
Clearing a pipeline right of way through a swamp.

Right of Way

As soon as the right of way is obtained a crew of men is organized to go ahead of the construction crews to remove any obstacles in the course of the line, such as timber, undergrowth, etc., and to grade such points along the line so that the pipe-screwing machines and ditching machines, as well as the construction crews can move along without delay as these points are reached.

Transporting the Material and Stringing

The steel companies have been instructed to ship the pipe to designated railroad points, which are nearest the course of the pipeline. When the pipe is received it is unloaded at these various points and hauled by truck to points along the pipeline; from these points the pipe is strung along the course of the line by teams, trucks or man power. Along the stakes, which have been set by the engineers in the course of the line, the pipe is distributed in a long string so that it is convenient for the construction



The pipe is received at the nearest railroad points along course of pipeline.

gang to use the pipe as it is required. The hauling and the stringing of the pipe is done usually by a contract. Sometimes a contract is let to one firm to build the line, and the contractor sublets the hauling of the pipe, stringing of the pipe, ditching, backfilling, etc.

Transportation Difficulties

Due to the fact that a pipeline takes a rather direct course, it passes very often through sections of the country where there are few or no roads, and the transporting of the material to the

The pipe is hauled in and strung along the course of the pipeline.

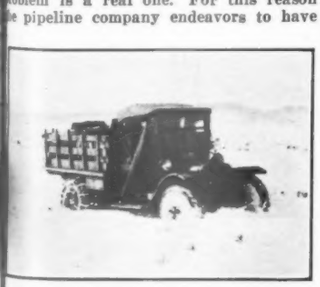
pipeline becomes a real problem. In the reconnaissance survey of the engineers, trails and roads leading to the pipeline right of way are chosen. At some points the pipeline may be as far as 40 or more miles away from the railroad point where the pipeline material is received. These trails leave the highway and have a rather nondescript course to the pipeline; they pass through farm land, along lanes, across open prairies, through canyons, up and down steep grades, along the slopes of hills that are too steep to climb, zigzagging as the go, through lanes hewn across dense timber land, across creeks and over hills and mountains, finally bringing one to the pipeline right of way which follows its direct course through miles of an unfrequented country.

Hauling heavy engine parts over a long distance to a pumping station, which is being constructed.

Over such a course, the trucks, heavily loaded with pipeline material, encounter

Truck, heavily loaded with pipeline material, stuck in a creek crossing along one of nondescript pipeline trails.

many difficulties, and the transportation problem is a real one. For this reason the pipeline company endeavors to have



Pipeline truck trying to make emergency trip of 40 miles over snow-bound trail that follows high points of rolling land.

the material moved in over these trails when the weather conditions are best.

Pipeline Camps

Before the construction of a pipeline begins, camps will be established along the line to house and feed the men employed in the construction crew. A camp will be established and maintained in one place as long as the distance the men must be hauled to work by truck is not greater than 5 miles. As the building of the pipeline progresses the camp is moved ahead of the crew 4 or 5 miles. Along the line there will be a number of camps depending upon the number of crews at work. Along any one section of the line, there may be a camp for the ditching crew, one for the men who are laying the line, and possibly a camp for the men who are doping the pipeline.

Due to the temporary character of these pipeline camps, tents are used entirely. One of these pipeline camps will consist of a "mess house," the "high pressure" quarters, the commissary tent, and the sleeping quarters for the men.

The "mess house" is a long tent which covers the kitchen and the dining room. As a rule there is only the earthen floor in this place as well as in the sleeping quarters. Except for its temporary character, the kitchen differs little from that of any other camp kitchen. In the dining room there are usually two tables, 30 to 40 feet long, with an aisle between them for serving the food. Attached to the tables are benches. The tables are covered with oilcloth and as a rule tin and enameled dishes are used.

In a pipeline camp there will be from 50 to 100 men, and when there is not enough room to serve all of these men at one time, the tables are cleared and prepared for those who must wait for the second table. Breakfast and supper are served in the camp, but the noon meal is taken to the men by a truck in case they are too far from the camp. It might be mentioned here that this noon meal is not a cold lunch; for pipeliners cannot live on such a fare. On the contrary a hot meal is taken out to the men.

Pipeline camp, isolated in an unfrequented country.

The different kinds of food are put in two or three-gallon pails and taken out to the place where the men are working. The buckets are set in a row, and the men who are given tin plates, cups, knives, spoons and forks, pass by the buckets and help themselves to the various foods. Of course a good supply of hot coffee and canned milk has been brought also. Pie or cake is a part of this meal, too. Breakfast and supper at pipeline camps are real meals; of course they are not prepared with much style, but there is always an abundance of good food on the table. The men must have good food and plenty of it for their work uses up much of their energy. The cook, who is assisted by "flunkies," sees that the food is properly prepared and served.

The "high pressure" tent is the headquarters of the camp, and it is here that the construction foremen and the timekeepers make their headquarters. The official business of the camp is carried on here.

In the sleeping quarters of the men there are about 20 cots which are arranged on either side of the tent with an aisle between them. The cots are provided with a mattress and blankets, but sheets are almost out of the question. The sleeping quarters are under the care of the "crumb boss," who is responsible for the cleanliness of the place.

The water supply for such a camp is usually hauled a long distance by team or truck; for a water supply is rarely available near the pipeline camps.

On a job of this kind there it little to do besides working, eating and sleeping, and being isolated the men find recreation in cards, dice and telling stories.

Welding a pipeline by the oxygen-acetylene method.

Laying the Line

Pipelines are connected either by welding or screwing. In the case of the welding, line pipe is purchased in lengths of about 20 feet and welded into joints of 40 feet along the pipeline right of way; following the men who weld the two joints together are other welders who connect the pipe in the line by further welding. These welds may be made either by the electrical or oxygen-acetylene method; the latter method is generally used, and acetylene generators are strung along the section of the line that is being constructed. Oxygen cylinders are strung along the line also, and the oxygen is used as it is needed. The welding of pipelines requires careful workmanship and skilled men.

In the case of the screwed line, the pipe is strung with a coupling on one end, a thread protector on the other end. The line is laid either by hand or machine. The more recent practice on trunk lines is to lay the line by the machine, except in places where it is impossible for the machine to operate. After the pipe has been strung the thread protectors are removed as the pipe is screwed into the line. Each joint of pipe is supposed to be swabbed out to remove anything that might obstruct the line. At the end of each working day the line is closed with a bull plug to prevent wild animals entering it. The line is screwed together as the machine progresses along the course, and about 40 to 60 men are required in the crew in this type of construction. In the case of the hand-laid pipe, 50 to 100 men are required to carry out the various duties, when laying 8 to 12-inch lines. For a long time there was considerable prejudice against the pipeline laid by machine, but the machine-laid lines have proved satisfactory, and the use of the machine is an efficient and economical way of laying a line.

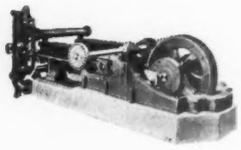
Laying pipelines by hand.

A pipeline right of way through a rough and broken country. The pipeline is ready to be lowered into the ditch.

Ditching

The pipeline is screwed and laid and following the pipe-laying machine is the ditching machine which digs a ditch wide enough and deep enough to care for the pipe, allowing 18 inches to 2 feet for the line to lay below the surface of the ground. Only a few men are required in this ditching work. The ditching machine travels along the ground as a tractor; but there are places where it can not go—then it is necessary to do the ditching by hand. In case rock is encountered,

An Idea



It is quite common to see a refinery or an oil production for sale, but very unusual to see a pipe line advertised.

They are simply not for sale.

Why?

Because, well located pipe lines are money-makers.

We offer for your consideration the idea that it is high time to plan to take advantage of the economies and convenience of transporting fuel oil, gasoline and kerosene by pipe line. Not that we believe the indiscriminate installation of such lines would be profitable, but it is our honest conviction that many large refineries could deliver their products more economically and conveniently to central wholesale points by pipe line than by any other method.

The officials of this Company are practical pipe line men with experience in all phases of this work—construction, operation and accounting. This, together with forty-five years experience in pipe line and refinery pump development p'aces us in an exceptionally good position to render assistance along these lines.

We stand ready and willing to work with you on any oil handling problem, without any obligation, of course.

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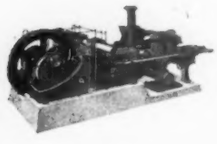

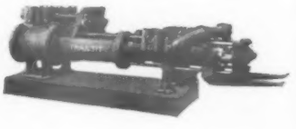

An Ideal

FIRST OIL WELL

In the Oil Creek Valley, two miles Southeast of Titusville, Pa., visible from the Pennsylvania Railroad, a natural stone monument was erected about twelve years ago marking the spot where the first well was drilled for oil by Edwin L. Drake. This monument was erected by the Canadohta Chapter of the Daughters of the American Revolution in commemoration of the discovery of oil.

We have often thought that many men now identified with the oil industry would appreciate a photograph of this monument. Oftentimes, such a photograph tends to relieve the mercenary atmosphere of an office.

We of the oil industry are not hero worshippers, but we do render unto Caesar the things that are Caesar's. Therefore, to Edwin L. Drake should go our respect and reverence for his great discovery. His "foresight, energy and persistence" should stand as an ideal for the industry.

If you feel the same as we do about this, we will be pleased to send you an 8 x 10" photograph like the above illustration, suitable for framing, of the Drake Monument and the discovery well.

Please give the name of your Company, your name and address, and your position. Address the Home Office.

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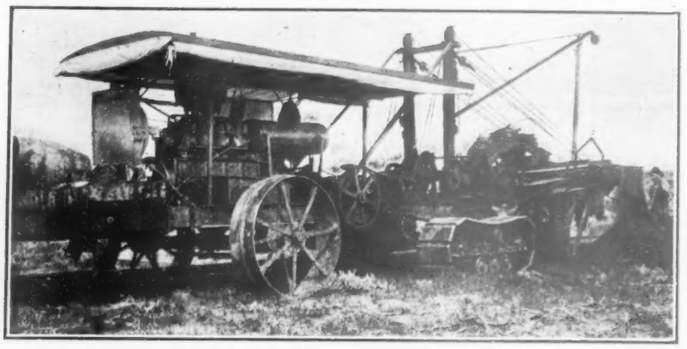
the practice is to blast the rock, providing plenty of room in the rock for the expansion and contraction of the line.

Obstructions in the Course of the Line

Along the course of the pipeline, a great number of obstacles will be encountered, such as canals, irrigation ditches, railroad crossings, rivers and towns. In the case of road and railway crossings it is necessary to pass the pipelines beneath them by means of conduits. When railroad crossings are encountered, the roadbed is bored horizontally at a certain depth below the railroad; casing is inserted and the pipeline is passed through it. Where the line is encased, as in this condition, provision is usually made for venting the casing about the pipeline. Where hard surfaced roads are crossed, likewise a boring is made for the line to pass through a casing which is inserted under the road; this eliminates the necessity of breaking the road surface in case the line must be removed or repaired at any time. When a pipeline goes into the limits of a city, as is often the case in approaching a refinery, it is necessary to encase the lines in concrete, which removes to some extent the hazards of the line breaking in the city limits.



A pipeline ditching machine in operation.

Expansion joints are not used in pipelines. It is not generally known that expansion joints are not used in pipelines, and the question is often asked: What provision is made for the expansion and the contraction of the line which must suffer rather extreme changes of temperature? The expansion joint is considered impractical in a high-pressure pipeline, and provision is made for the contraction of the line by allowing sufficient slack in the line when it is lowered into the ditch. No trouble is experienced with the expansion of underground lines, but many breaks are the result of the lines pulling out of the couplings due to contraction; this occurs generally during the severe weather conditions. Thus when the line is lowered into the ditch, as much slack as desirable is allowed; very often the line is laid during the heat of the day and it is lowered into the ditch in the cool of the morning. Where the line traverses rather flat country, provision is made for the contraction by allowing the line to swing out of a straight course at intervals along the line.

Laying a pipeline by machine.

Preparing the Line

The procedure, after the ditch has been made, is to place the line over the ditch on skids and prepare it for a protective coating. By experience, the pipeline companies have found that the life of these pipelines is rather short when they are not protected from the corrosive action of the soil. It has become the policy of most pipeline companies to protect their main lines with a covering of some kind. The practice of some pipeline companies is, in the case of new pipe, to apply a primer coat of paint, which is usually an asphalt paint. Over the primer paint a layer of hot asphalt is applied, and on top of this a layer of asbestos-felt tar paper is wrapped about the application of hot asphalt on the pipe and sealed. Over the paper covering another application of hot asphalt is made so as to form an impervious protective coating to the pipe. It is believed that this covering will protect the line from the action of the soil and materially extend the life of the pipe. This policy seemed advisable when it had been learned that after a period of seven to ten years considerable trouble would be experienced with leaks along the line, which would necessitate the use of saddles or leak clamps. This corrosion also affects the pipe to such an extent that it is necessary to lower the operating pressure of the line, and consequently the capacity of the line is reduced and the efficiency lowered.

Applying asphalt and paper to pipeline.

In this doping process, barrels of the primer paint are distributed along the line at such points as it is to be used, also drums of asphalt and rolls of paper. The primer paint is applied cold; but the asphalt material is heated in pots which are placed along the line. The hot asphalt is drawn from the kettles and carried along the line in buckets where it is poured into a strip of the asbestos felt paper which is held by several men under a length of the pipe in a trough-like shape, and when the hot asphalt is poured into the paper it is distributed smoothly over the whole of the pipe surface, and the paper is then drawn tightly about the pipe to which it is bound and sealed by the hot asphalt. A top coating of hot asphalt is applied over the paper covering by a canvas blanket which is handled by two men. The method completely encases the pipe with an almost impervious layer of paper and asphalt.

Lowering the Line

After the line has been covered with a protective coating, it is ready to be lowered into the pipeline ditch. Great care is required to lower the line without straining any of the joints. The skids under the line are removed for a certain distance of the line and the pipe windlass allows the line to be lowered gradually. After a short length of the line has been lowered the pipe windlass is moved ahead and an additional length of line is lowered; thus in short lengths the whole line is lowered into the ditch.

Gas line being coated with asphalt.

Line is ready to be covered with a protective coating and lowered into ditch.

Backfilling the Ditch

As soon as the pipeline is lowered into the ditch a crew of men follow with teams and equipment and fill the ditch so that it is heaped over with dirt. After all the various processes, described above in laying the line, have been completed, the line is ready for a test before the oil is put into it.

Testing the Line

For a quick test, air pressure can be applied, and later on a hydraulic test with water is made. A test with 50 pounds of air will indicate quickly collar leaks, split joints or any place where the line has separated since the construction. The lines are tested then to at least the working pressure of the line by filling it with water and applying the pressure with the main line pumps and closing the line at the delivery end after the water has been received there. A long line is tested progressively in sections between stations. Where any defect in the line has been found by the test, it is repaired.

Laying a pipeline under adverse conditions.

River Crossings

River crossings are encountered in the construction of a pipeline and special methods of laying the pipe are used here, depending on the size and the depth of the river. On the navigable rivers the Federal Government requires that the line be a certain depth below the river bed; in such cases dredging is necessary. The procedure at a river crossing is to determine the course the line is to take across the river, and then to make a sounding of the river at intervals along the course of the line; from these data a profile is plotted and the engineers determine what dredging and right of way work must be done in the river bed and on the banks of the river to permit the line to be laid without any strain.

Lowering pipeline into ditch.

The pipeline has been lowered into the ditch.

It is very important that the line be laid firmly on the bottom of the river so that there will be no strain in it and possibly a leak or break later; for it is rather costly to repair or raise a line after it has been laid in the river. It is customary to use a diver to inspect the

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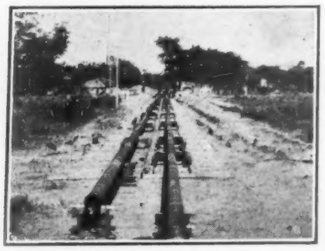
line after it has been laid on the river bottom.

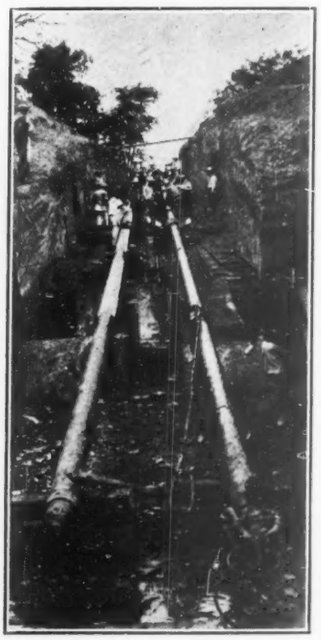
In the case of the smaller rivers, the lines are pulled across them. When this is done it is possible to either screw or weld on one bank of the river the entire length of line that is to cross the river, and pull it across later. Or, the line can be pulled across the river bed progressively as joints of pipe are added one by one on the bank of the river. It is general practice to weld river lines and place river clamps, weighing about 800



Connected river lines ready to be pulled.

pounds each, to reinforce the welded joint and to insure the settling of the line into a firm foundation in the river bed. When the line is welded 40-foot joints of extra heavy pipe are used when obtainable. When a line is pulled it can be done either by pipe winches, as in the case of a short crossing, or possibly by means of dead-men, block and tackle and tractors.

The pipeline in a river crossing is bowed upstream, and this is done when a line is pulled or dragged across the river bed by locating the pipe winch or dead men and pulleys upstream at a distance above the landing point on the opposite river bank and pulling the line diagonally upstream until the front end of the pipe reaches some point near midstream; then the pulling equipment is moved downstream to the landing point and the pulley force is applied downstream from the



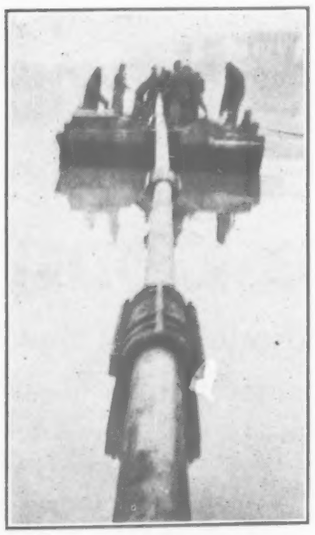
Two 8-inch lines ready to be pulled across the Panuco River, Mexico.

landing point. In this way the line is pulled in the course of an arc across the river. Some accompanying pictures show two 8-inch lines being pulled across the Panuco River, Mexico. In this case the river banks were graded to conform with the slope of the river channel. The total length of the line required to cross the river was screwed together on the right of way on the river bank; the line was coated with canvas and hot asphalt and the river clamps were attached. To facilitate the pulling of the line, a tramway was built back from the edge of the river along the length of the connected line. The pipe was mounted on tramcars, and as the line was pulled into the river, the tramcars moved along on the track and as they reached the water's edge they were removed. The line was pulled by a heavy cable, attached to the pipe and extending to the opposite bank of the river, where a pulling force was applied by a tractor working through block and tackle. A barge and a steamboat were also used to help in the operation.

On the large rivers the lines are laid from barges, which are towed along the course of the line across the river. In this case two barges are generally used. One barge is used to carry the pipe and equipment; also the pipe is screwed or welded together on this barge. The other

Laying a river crossing from a barge.

barge trails the laying barge by 150 or 200 feet, and this barge is used to support the pipeline as it slides off into the river so that the line is not suspended from the laying barge at too great an angle which might put a strain in the line or cause it to break. The distance the one barge trails the other depends upon the depth of the water. In some cases the line is laid in the river directly from the laying barge. A boom is used on the laying barge to swing the joints of pipe in position and hold them while the pipe is being screw or welded together. Before lowering the line into the river, heavy clamps are put on the line at each joint or weld. A protective covering of asphalt is put on the line before it is lowered into the river. Extra heavy pipe is used in all river crossings. After the



Laying a river line from a barge.

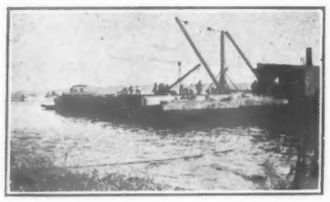
line has been laid a diver inspects the line to see that it is "on bottom." At important river crossings, two or more lines are laid across the river to prevent the trunk line system being shut down on account of a break in one of the lines; because considerable time is required to repair a river crossing.

Station Construction

While the pipeline is being built, the stations, tanks, reservoirs, pipeline junctions, etc., are also being constructed. Probably the first step in the construction of a main line pumping station is the establishing of a camp and warehouse, as well as a commissary and an organization to manage the respective duties of a camp.

Where the construction work warrants, a camp of fairly good size is built to house the men, and it is good policy to provide sanitary conditions because the men are better fitted to work. Such a camp would include a mess house, commissary, bunk houses, lavatories and bath. A man is delegated to take charge of the commissary, and also a man to supervise the bunk houses. Of course, water is one of the most essential things in a camp, and it is an early step in camp construction to obtain an abundant water supply.

Many times construction work is carried out without a properly constructed warehouse, where material can be handled and a careful check kept on it. It is good practice to have all materials assigned to the construction of stations handled through a warehouse.



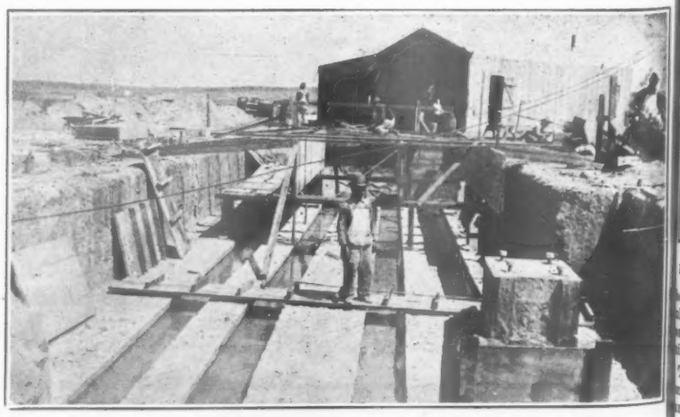
Laying a river line by barge.

Building the Pumping Station

In the building of a pumping station, the foundations for the machinery are first excavated after the center lines for the machinery have been established. Then the forms for the foundations are set, reinforcing rods and machinery bolts are fixed and the concrete is poured. It is customary in the large machinery foundations to pour a footing or slab, upon which the foundation rests. The pump and engine foundations are poured as one block, and the pouring of the concrete is usually a continuous process until the foundation has been completed; the purpose of pouring continuously is to have the foundation free of any cleavage planes between the separate pourings of concrete. The foundation footing is provided to bear the weight of the machinery and the forces of the machinery without allowing any part of the equipment to settle unevenly; for any unequal settling of the foundation will cause misalignment of the machinery parts and consequently wear and damage. As soon as the machinery foundations have been poured, the building foundations are made and the concrete reservoir is built. The next step is the erection of the steel framework on the building foundations. As soon as the concrete foundations are ready the machinery parts are moved in and the erection of the engines and pumps is started. The main line pumping stations are generally provided with steel cranes for handling the heavy pieces of machinery. Where the crane is available it is used in the erection of the engines and the pumps, but sometimes the machinery is erected before the building and it is necessary to use gin poles, jacks and chain hoists for assembling the machinery. The heavy parts of the machinery are received separately and it is the work of the machinists and pipefitters to assemble the parts, arrange the

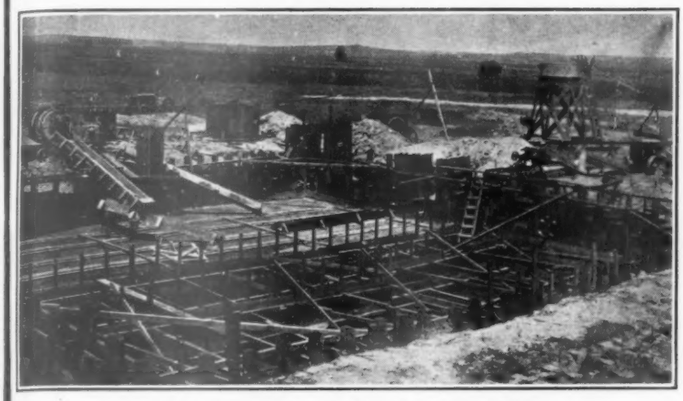
Laying river lines across the Kaw River, Kansas.

Construction material is being received at the station site.



Foundation excavation and footing.

piping for the units, put the machinery in good condition and prepare it for operation. As soon as the engines and pumps are assembled they are given a trial test and inspection before putting them into actual operation. While the machinists are erecting the pumps and the engines, steel storage tanks are being built, concrete reservoirs for water are being constructed, suction and discharge lines to the tanks are being laid, manifolds are being built, the fuel and water tanks are being erected and the piping about the station is being arranged. The work is being carried according to a schedule so that the completion of the job will not be delayed by any part of the work.



Building a concrete reservoir at a pumping station.

Assembling the pump and engine parts.

Telephone and Telegraph System Built

While the pipeline is being laid and the pumping stations are being built, a telephone and telegraph system is being constructed so that when the pipeline has been completed communication can be established all along the line. As in the case of railroads communication over the whole of the pipeline system is imperative. Communication is so important in the dispatching of oil that it is a general rule to shut down pumping stations after communication has been lost for a certain length of time.

Erecting a 600-horsepower Diesel Engine

The telephone and telegraph system connects the general office with every pumping station and delivery point on the system. The telephone system centers in the office of the chief oil dispatcher, where the oil is checked hourly over the whole system to determine any loss of oil in transit and to see that the required deliveries are being made. From the office of the chief oil dispatcher the oil streams in the pipelines are directed so that the deliveries to the terminals are sufficient and that a balanced condition is maintained over the system as to daily runs from the field, deliveries and storage. The oil dispatcher receives the hourly pumping records for each pumping station and checks the data carefully for any discrepancy. The telephone and telegraph systems are used also for general communication in the management of the system. A staff of operators is maintained at the general office for receiving and transmitting messages.

The telephone and telegraph wires are usually put on the poles of the pipeline company, but there are cases where it is more economical and convenient to string the wires on the poles of another company, possibly the poles of a railroad company, a telephone or telegraph company, or another pipeline company. When the wires are strung on the poles of another company, a lease over a period of time is obtained.

A lineman is kept in each division of the system, and it is his duty to keep the telephone and telegraph circuits in good repair, to maintain communication, to remedy the grounding or short circuiting of the line, and to repair any break in the line. A wire chief is kept at the general office to supervise the telegraph office, to check the circuits for trouble and to assist in maintaining communication. Wire chiefs are located also at other strategical points on the system.

In the past pipelines, notwithstanding the obstacles, have been built to the remote places where oil has been produced, so in the future these lines will be extended to the farthermost places in order that the products of petroleum might be available as the necessities of commerce and industry.

OVER 2,000,000 BBLS. OF CRUDE HANDLED DAILY IN PIPELINES

By L. M. Fanning

With the proven economy of pipeline transportation dating back really to the early days of the industry, the constantly increasing mileage of gathering and trunk line systems has followed logically along with the opening up of new oil fields and the necessity for transporting tremendously increased quantities of crude oil.

Today crude oil production is running over 2,000,000 bbls. a day, virtually all of which gets into a pipeline for short or long distance carriage. In 1914 the daily average production ran around 730,000 bbls., and the pipeline mileage in those days was commensurately smaller.

Total gathering and trunk line mileage at the present time is about 85,000 miles—a veritable "underground railway" system. In 1914 the country's total pipeline mileage probably did not exceed 12,000 miles, but some of the main trunk line systems from the Mid-Continent fields to Chicago and east to the Atlantic Seaboard and from the Mid-Continent fields south to the Gulf Coast were established.

Invested $8,000,000

In terms of money spent, the present pipeline system represents around $800,000,000, and its establishment and maintenance constitutes a great industry in itself. The country's pipeline fabric is curiously like the railroad system. It has trunk lines, feeders, terminals, storage yards, switching systems, dispatchers, telegraph and telephone systems.

The pumping plants are complete pumping-power stations, and represent an aggregate expenditure running into the tens of millions of dollars. No estimate is obtainable as to the investment represented by pumps employed in pipeline stations, but the aggregate is very high. One estimate places the total spent in the past 15 years on Diesel engines alone for pipelines in the United States at $15,000,000.

First Line in 1865

The first successful pipeline, 4 miles in length, was laid in the oil pools of western Pennsylvania in 1865, and in 1875 a 4-inch line, 60 miles long, was laid from these oil pools to Pittsburgh. Prior to 1876 crude oil was almost entirely refined in the neighborhood of the wells, but after this time refineries were located near large consuming markets, such as Cleveland, Pittsburgh, Buffalo, Baltimore, Philadelphia, and New York, and pipelines were laid from the oil fields to these points. The development of pipeline construction increased rapidly after 1876, and by 1892 there were numerous pipelines, aggregating 3,000 miles in length, mostly 5 and 6 inches in diameter, connecting the oil pools of western Pennsylvania with refineries located in the larger cities of Ohio, Pennsylvania, Maryland, New Jersey and New York.

The economy of pipeline transportation of crude oil had been thoroughly established long before crude oil was discovered in the Mid-Continent Field. In 1903 and 1904, after a substantial production had been obtained in southeastern Kansas and northeastern Oklahoma, the development of a large pipeline system in this field began. By the end of 1914 the trunk line mileage of the five large interstate systems alone equaled about 4,320 miles of continuous line, while the total mileage of trunk lines operated by them was about 6,590 miles.

Building a Line

Building a pipeline, like constructing a railroad, involves first a survey of the route with regard to grades, stream crossings and the like. But a railroad seeks the cities in order to get business, while the pipeline avoids towns to save expense.

A feasible survey being made, right of way is secured by purchase or long-time easements. Then gangs of men distribute the pipe and join it into a continuous line. This joining is done before the pipe is lowered into the trench that meanwhile has been dug for it, largely by great power ditching machines. Finally, the jointed pipe is lowered into the trench and buried, commonly about 18 inches, but deeper in cold regions.

Under railroad lines a double pipe is used; the inner is the pipeline proper, while the outer and much larger one is designed to catch the petroleum in case of leakages and guard against fires. At large streams the pipe may be jointed together on the ice in winter, and then lowered through a trench in the ice to the river's bed. In summer it is jointed on flatboats and strung across the river from them, much as ocean cables are laid. The pipe lies on the river bottom, anchored by huge clamps at the joints, weighing about 1,000 pounds each, to prevent drifting.

According to desired capacity, the pipe may be 4, 6, 8, 10 or 12 inches in diameter, or even larger. While the pipe is being laid, pumping stations are erected to push the petroleum along. Commonly these are about 40 miles apart, but in rough country, or for heavy and viscous oil, much closer. A pumping plant includes engines and pumps powerful enough to shove the oil along to the next station.

Preparation of the right of way includes cuts through forests, grading, bridging and the like. In soils which would corrode pipe, the latter is painted with asphalt before burying. Sometimes roads must be built before machinery can be hauled in.

Pumping Plants

The pumping plants are complete pumping-power stations, often in very isolated spots. At each station storage tanks are provided of 10,000 to 55,000 bbls. capacity, and oil is pumped directly to and from these; that is, there is not a continuous stream from one end of the system to the other, but a succession of pumpings from one storage tank to the next. A 4-inch pipeline with 800 pounds per inch pressure will deliver about 3,800 bbls. per day; a 6-inch line, 10,000 bbls.; 8-inch line, 21,000 bbls.

Pressure gauges at each pumping station immediately register any stoppages of flow or leakages. When a break is indicated, the engineer instantly telephones the next station ahead, and telegraphs the superintendent. Then the engines are reversed so as to draw the oil, by suction, away from the break. Line walkers, corresponding to the railroad's track walkers, hurry out to locate the break, and gangs are always at hand to make repairs. Because of the storage tanks at pumping stations a break does not necessitate suspension of pumping except in the section where the break occurs; all other sections go right on pumping from and to the storage tanks.

Like a railroad, a pipeline is built throughout on a uniform gauge; that is, diameter of pipe. When it is necessary to increase capacity another pipe is laid parallel to the first.

There is a chief dispatcher for the system, and local dispatchers who report regularly on pressure and movement of oil. The contents of storage tanks are regularly measured and checked against the pressure figures to determine if all the oil moving is actually getting into the tanks. Thus even the smallest leakages are detected.

The "underground railway" system of the United States transports annually half as much freight tonnage as do the railroads of France. Its mileage is twice that of all German railroads and nearly four times that of British railways.

The 85,000 miles of trunk and gathering pipelines in the United States represent over one-third the railroad mileage of this country.

THE NAME THAT STANDS OUT

HO

The pictures on this page show one phase of Hope pipe line construction — operations in mountain and valley and desert, miles from any railway, where every foot of pipe must be handled over the most difficult country. Yet, in every case, the schedule of progress was maintained, unfailingly.

More than 3000 miles of Hope-built pipe lines, in all the important fields, testify to the supremacy of the Hope Company in the world of pipe line construction.

These pipe lines have been built under all conditions—in all climates—in all seasons—in all weathers—frequently against seemingly insurmountable obstacles—often under most exacting time limits.

But never has a Hope-built pipe line failed to conform to the specifications or fallen short of the complete satisfying of the company for whom it was built.

HOPE ENGINEERIN

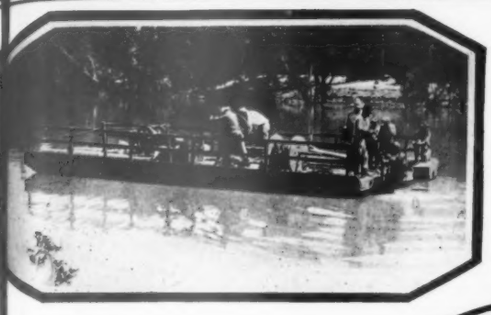
HOME OFFICE MOUNT

DALLAS, TEXAS

Ho ice

Engineering counsel, aid in finan gn, cons —in pipe lines for oil and gas, ping sta and boosting plants, gasoline rec ms, city

Unit bility



PE

IN PIPE LINE CONSTRUCTION

And on this page still other examples are pictured, of the conditions which the Hope organization meets and conquers — marsh and swamp and forest— torrential rains and floods — submarine crossings made only with the aid of divers. But the line was laid, and delivered on time, and functioned to the satisfaction of all.

Hope Service in pipe line construction is nation-wide. The Hope organization is ever ready, with equipment and personnel to enter immediately upon any enterprise entrusted to it, and to drive it to completion in contract time.

Hope experience and resources, and the magnitude of Hope operations, enable this company to command the instant cooperation of manufacturers to whom it must look as sources of materials supply.

The Hope Company, in its activities as engineers and contractors, is unhampered by affiliations or obligations involving any other concern. It is absolutely independent in its operations.

IN SUPPLY COMPANY

T NON, OHIO, U.S.A.

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Ho ice

it bility

ign, construction and contracting
ping stations, gas compressing
ms, city and inter-city gas mains.

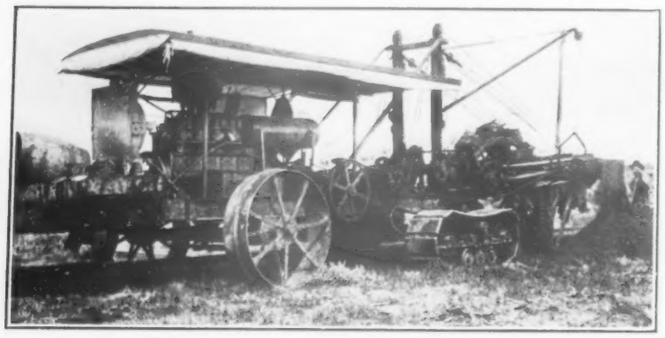
the practice is to blast the rock, providing plenty of room in the rock for the expansion and contraction of the line.

Obstructions in the Course of the Line

Along the course of the pipeline, a great number of obstacles will be encountered, such as canals, irrigation ditches, railroad crossings, rivers and towns. In the case of road and railway crossings it is necessary to pass the pipelines beneath them by means of conduits. When railroad crossings are encountered, the roadbed is bored horizontally at a certain depth below the railroad; casing is inserted and the pipeline is passed through it. Where the line is encased, lowing the line to swing out of a straight course at intervals along the line.

Preparing the Line

The procedure, after the ditch has been made, is to place the line over the ditch on skids and prepare it for a protective coating. By experience, the pipeline companies have found that the life of these pipelines is rather short when they are not protected from the corrosive action of the soil. It has become the policy of most pipeline companies to protect their main lines with a covering of some kind. The practice of some pipeline companies is, in the case of new pipe, to apply a primer coat of paint, which is usually an asphalt paint. Over the primer paint a layer of hot asphalt is applied, and on top of this a layer of asbestos-felt tar paper is wrapped about the application of hot asphalt on the pipe and sealed. Over the paper covering another application of hot asphalt is made so as to form an impervious protective coating to the pipe. It is believed that this covering will protect the line from the action of the soil and materially extend the life of the pipe. This policy seemed advisable when it had been learned that after a period of seven to ten years considerable trouble



A pipeline ditching machine in operation.

as in this condition, provision is usually made for venting the casing about the pipeline. Where hard surfaced roads are crossed, likewise a boring is made for the line to pass through a casing which is inserted under the road; this eliminates the necessity of breaking the road surface in case the line must be removed or repaired at any time. When a pipeline goes into the limits of a city, as is often the case in approaching a refinery, it is necessary to encase the lines in concrete, which removes to some extent the hazards of the line breaking in the city limits.

Expansion joints are not used in pipelines. It is not generally known that expansion joints are not used in pipelines, and the question is often asked: What provision is made for the expansion and the contraction of the line which must suffer rather extreme changes of temperature? The expansion joint is considered impractical in a high-pressure pipeline, and provision is made for the contraction of the line by allowing sufficient slack in the line when it is lowered into the ditch. No trouble is experienced with the expansion of underground lines, but many breaks are the result of the lines pulling out of the couplings due to con-

Laying a pipeline by machine.

traction; this occurs generally during the severe weather conditions. Thus when the line is lowered into the ditch, as much slack as desirable is allowed; very often the line is laid during the heat of the day and it is lowered into the ditch in the cool of the morning. Where the line traverses rather flat country, provision is made for the contraction by al-

Applying asphalt and paper to pipeline.

would be experienced with leaks along the line, which would necessitate the use of saddles or leak clamps. This corrosion also affects the pipe to such an extent that it is necessary to lower the operating pressure of the line, and consequently the capacity of the line is reduced and the efficiency lowered.

In this doping process, barrels of the primer paint are distributed along the line at such points as it is to be used, also drums of asphalt and rolls of paper. The primer paint is applied cold; but the asphalt material is heated in pots which are placed along the line. The hot asphalt is drawn from the kettles and carried along the line in buckets where it is poured into a strip of the asbestos felt paper which is held by several men under a length of the pipe in a trough-like shape, and when the hot asphalt is poured into the paper it is distributed smoothly over the whole of the pipe surface, and the paper is then drawn tightly about the pipe to which it is bound and sealed by the hot asphalt. A top coating of hot asphalt is applied over the paper covering by a canvas blanket which is handled by two men. The method completely encases the pipe with an almost impervious layer of paper and asphalt.

Lowering the Line

After the line has been covered with a protective coating, it is ready to be lowered into the pipeline ditch. Great care is required to lower the line without

Gas line being coated with asphalt.

straining any of the joints. The skids under the line are removed for a certain distance of the line and the pipe windlass allows the line to be lowered gradually. After a short length of the line

Line is ready to be covered with a protective coating and lowered into ditch.

has been lowered the pipe windlass is moved ahead and an additional length of line is lowered; thus in short lengths the whole line is lowered into the ditch.

Backfilling the Ditch

As soon as the pipeline is lowered into the ditch a crew of men follow with teams and equipment and fill the ditch so that it is heaped over with dirt. After all the various processes, described above in laying the line, have been completed, the line is ready for a test before the oil is put into it.

Testing the Line

For a quick test, air pressure can be applied, and later on a hydraulic test with water is made. A test with 50 pounds of air will indicate quickly collar leaks, split joints or any place w the line has separated since the conc tion. The lines are tested then t least the working pressure of the lin filling it with water and applying pressure with the main line pumps closing the line at the delivery end the water has been received there long line is tested progressively in tions between stations. Where any fect in the line has been found by test, it is repaired.

River Crossings

River crossings are encountered in construction of a pipeline and sp methods of laying the pipe are used depending on the size and the depth

Lowering pipeline into ditch.

the river. On the navigable rivers Federal Government requires that line be a certain depth below the r bed; in such cases dredging is necess The procedure at a river crossing is determine the course the line is to across the river, and then to mak sounding of the river at intervals a the course of the line; from these

The pipeline has been lowered into t ditch.

a profile is plotted and the engineer termine what dredging and right of work must be done in the river bed on the banks of the river to permit line to be laid without any strain.

Laying a pipeline under adverse conditions.

It is very important that the line laid firmly on the bottom of the river that there will be no strain in it possibly a leak or break later; for rather costly to repair or raise a after it has been laid in the river. customary to use a diver to inspect

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Quality is welded into every inch of "CENTRAL" Line Pipe. It can be depended upon under the severest of tests. Some of the largest Pipe Line Companies have attested to the efficiency of "CENTRAL." Manufactured under the latest processes, insuring clean threads, "CENTRAL" meets the requirements in every oil field operation.

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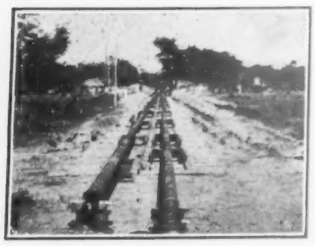
line after it has been laid on the river bottom.

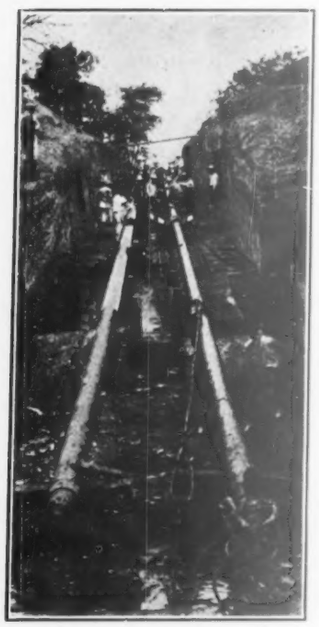
In the case of the smaller rivers, the lines are pulled across them. When this is done it is possible to either screw or weld on one bank of the river the entire length of line that is to cross the river, and pull it across later. Or, the line can be pulled across the river bed progressively as joints of pipe are added one by one on the bank of the river. It is general practice to weld river lines and place river clamps, weighing about 800



Connected river lines ready to be pulled.

pounds each, to reinforce the welded joint and to insure the settling of the line into a firm foundation in the river bed. When the line is welded 40-foot joints of extra heavy pipe are used when obtainable. When a line is pulled it can be done either by pipe winches, as in the case of a short crossing, or possibly by means of dead-men, block and tackle and tractors.

The pipeline in a river crossing is bowed upstream, and this is done when a line is pulled or dragged across the river bed by locating the pipe winch or dead men and pulleys upstream at a distance above the landing point on the opposite river bank and pulling the line diagonally upstream until the front end of the pipe reaches some point near midstream; then the pulling equipment is moved downstream to the landing point and the pulley force is applied downstream from the



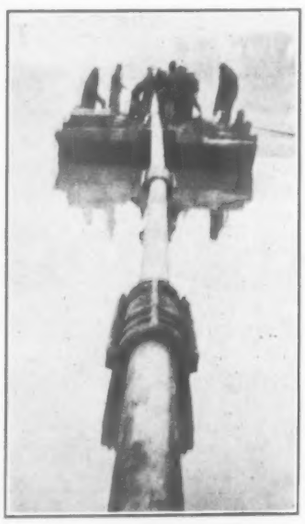
Two 8-inch lines ready to be pulled across the Panuco River, Mexico.

landing point. In this way the line is pulled in the course of an arc across the river. Some accompanying pictures show two 8-inch lines being pulled across the Panuco River, Mexico. In this case the river banks were graded to conform with the slope of the river channel. The total length of the line required to cross the river was screwed together on the right of way on the river bank; the line was coated with canvas and hot asphalt and the river clamps were attached. To facilitate the pulling of the line, a tramway was built back from the edge of the river along the length of the connected line. The pipe was mounted on tramcars, and as the line was pulled into the river, the tramcars moved along on the track and as they reached the water's edge they were removed. The line was pulled by a heavy cable, attached to the pipe and extending to the opposite bank of the river, where a pulling force was applied by a tractor working through block and tackle. A barge and a steamboat were also used to help in the operation.

On the large rivers the lines are laid from barges, which are towed along the course of the line across the river. In this case two barges are generally used. One barge is used to carry the pipe and equipment; also the pipe is screwed or welded together on this barge. The other

Laying a river crossing from a barge.

barge trails the laying barge by 150 or 200 feet, and this barge is used to support the pipeline as it slides off into the river so that the line is not suspended from the laying barge at too great an angle which might put a strain in the line or cause it to break. The distance the one barge trails the other depends upon the depth of the water. In some cases the line is laid in the river directly from the laying barge. A boom is used on the laying barge to swing the joints of pipe in position and hold them while the pipe is being screw or welded together. Before lowering the line into the river, heavy clamps are put on the line at each joint or weld. A protective covering of asphalt is put on the line before it is lowered into the river. Extra heavy pipe is used in all river crossings. After the



Laying a river line from a barge.

line has been laid a diver inspects the line to see that it is "on bottom." At important river crossings, two or more lines are laid across the river to prevent the trunk line system being shut down on account of a break in one of the lines; because considerable time is required to repair a river crossing.

Station Construction

While the pipeline is being built, the stations, tanks, reservoirs, pipeline junctions, etc., are also being constructed. Probably the first step in the construction of a main line pumping station is the establishing of a camp and warehouse, as well as a commissary and an organization to manage the respective duties of a camp.

Where the construction work warrants, a camp of fairly good size is built to house the men, and it is good policy to provide sanitary conditions because the men are better fitted to work. Such a camp would include a mess house, commissary, bunk houses, lavatories and bath. A man is delegated to take charge of the commissary, and also a man to supervise the bunk houses. Of course, water is one of the most essential things in a camp, and it is an early step in camp construction to obtain an abundant water supply.

Many times construction work is carried out without a properly constructed warehouse, where material can be handled and a careful check kept on it. It is good practice to have all materials assigned to the construction of stations handled through a warehouse.

Laying a river line by barge.

Building the Pumping Station

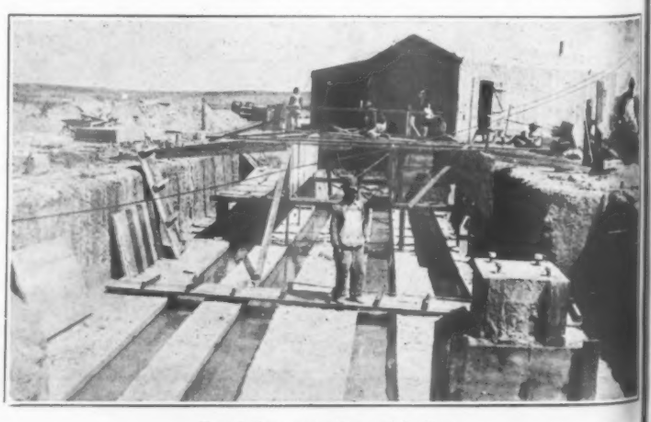
In the building of a pumping station, the foundations for the machinery are first excavated after the center lines of the machinery have been established. Then the forms for the foundations are set, reinforcing rods and machinery bolts are fixed and the concrete is poured. It is customary in the large machinery foun-

Laying river lines across the Kaw River, Kansas.

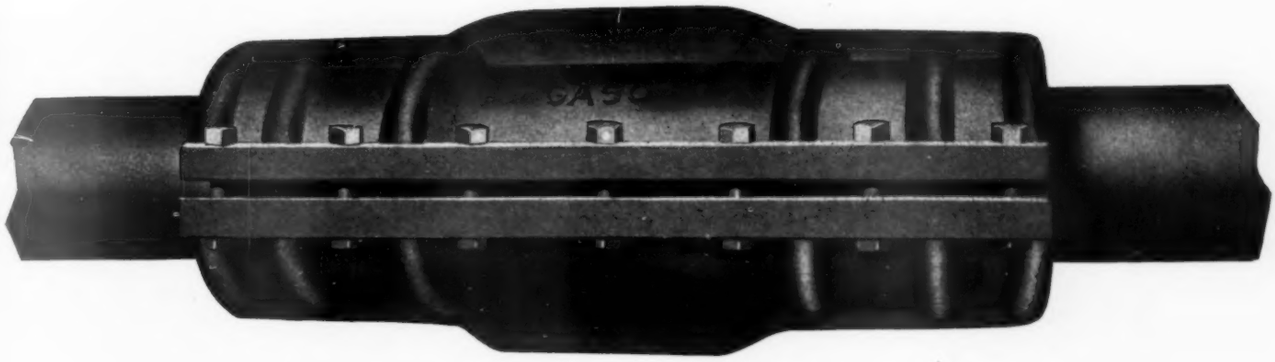
dations to pour a footing or slab, upon which the foundation rests. The pump and engine foundations are poured in one block, and the pouring of the concrete is usually a continuous process until the foundation has been completed; the purpose of pouring continuously is to have the foundation free of any cleavage planes between the separate pourings of concrete. The foundation footing is provided to bear the weight of the machinery and the forces of the machinery without allowing any part of the equipment to

Construction material is being received at the station site.

settle unevenly; for any unequal settling of the foundation will cause misalignment of the machinery parts and consequently wear and damage. As soon as the machinery foundations have been poured, the building foundations are made and the concrete reservoir is built. The next step is the erection of the steel framework on the building foundations. As soon as the concrete foundations are ready the machinery parts are moved in and the erection of the engines and pumps is started. The main line pumping stations are generally provided with steel cranes for handling the heavy pieces of machinery. Where the crane is available it is used in the erection of the engines and the pumps, but sometimes the machinery is erected before the building and it is necessary to use gin poles, jacks and chain hoists for assembling the machinery. The heavy parts of the machinery are received separately and it is the work of the machinists and pipe fitters to assemble the parts, arrange the



Foundation excavation and footing.



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GASO River Clamps, manufactured by the Tulsa Iron Works Company, Foundry Division of the Gaso Pump & Burner Mfg. Co.,—are made of the same extra quality of castings that are used in making the famous Gaso Oil Industry Pumps.

These clamps are built extra heavy, having six extra ribs extending around the entire clamp and an extra rib running the entire length of the clamp. They are tested on the size pipe for which intended.

GASO River Clamps have been used in the construction of many of the country's largest pipe lines. Orders will receive prompt attention.

The Tulsa Iron Works Company maintains a fully equipped pattern shop, and handles a limited amount of jobbing work, such as piston heads, cylinders, and liners, for operating companies in its territory. Highest grade work is guaranteed. Your inquiry is invited.

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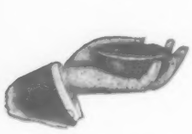
A cake of Carbic as taken from the drum —convenient and clean.



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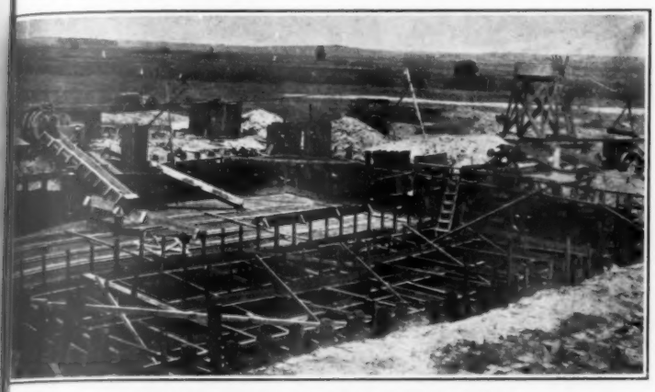
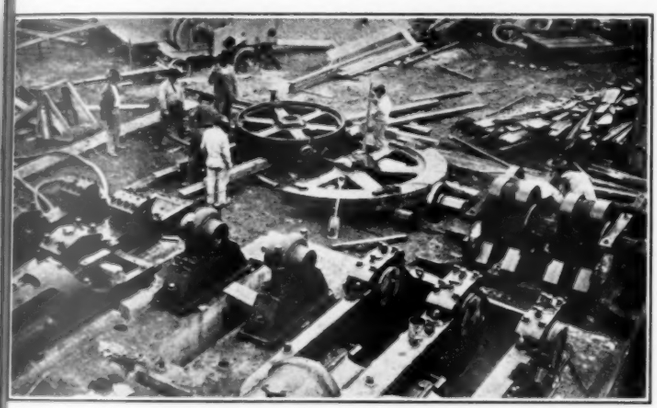
ing for the units, put the machinery good condition and prepare it for oper-ion. As soon as the engines and pumps e assembled they are given a trial test d inspection before putting them into ual operation. While the machinists e erecting the pumps and the engines, el storage tanks are being built, con-te reservoirs for water are being con-



Building a concrete reservoir at a pumping station.

tructed, suction and discharge lines to e tanks are being laid, manifolds are eing built, the fuel and water tanks are eing erected and the piping about the tation is being arranged. The work is eing carried according to a schedule so



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Telephone and Telegraph System Built

While the pipeline is being laid and he pumping stations are being built, a elephone and telegraph system is being onstructed so that when the pipeline has een completed communication can be stablished all along the line. As in the ase of railroads communication over the hole of the pipeline system is impera-ive. Communication is so important in

Erecting a 600-horsepower Diesel Engine

he dispatching of oil that it is a general ule to shut down pumping stations after ommunication has been lost for a cer-ain length of time.

The telephone and telegraph system onnects the general office with every umping station and delivery point on the system. The telegraph system centers in the office of the chief oil dispatcher, where the oil is checked hourly over the whole system to determine any loss of oil in transit and to see that the required deliveries are being made. From the office of the chief oil dispatcher the oil streams in the pipelines are directed so that the deliveries to the terminals are sufficient and that a balanced condition is maintained over the system as to daily runs from the field, deliveries and storage. The oil dispatcher receives the hourly pumping records for each pumping station and checks the data carefully for any discrepancy. The telephone and telegraph systems are used also for general communication in the management of the system. A staff of operators is maintained at the general office for receiving and transmitting messages.

The telephone and telegraph wires are usually put on the poles of the pipeline company, but there are cases where it is more economical and convenient to string the wires on the poles of another company, possibly the poles of a railroad company, a telephone or telegraph company, or another pipeline company. When the wires are strung on the poles of another company, a lease over a period of time is obtained.

A lineman is kept in each division of the system, and it is his duty to keep the telephone and telegraph circuits in good repair, to maintain communication, to remedy the grounding or short circuiting of the line, and to repair any break in the line. A wire chief is kept at the general office to supervise the telegraph office, to check the circuits for trouble and to assist in maintaining communication. Wire chiefs are located also at other strategical points on the system.

In the past pipelines, notwithstanding the obstacles, have been built to the remote places where oil has been produced, so in the future these lines will be extended to the farthermost places in order that the products of petroleum might be available as the necessities of commerce and industry.

OVER 2,000,000 BBLS. OF CRUDE HANDLED DAILY IN PIPELINES

By L. M. Fanning

With the proven economy of pipeline transportation dating back really to the early days of the industry, the constantly increasing mileage of gathering and trunk line systems has followed logically along with the opening up of new oil fields and the necessity for transporting tremendously increased quantities of crude oil.

Today crude oil production is running over 2,000,000 bbls. a day, virtually all of which gets into a pipeline for short or long distance carriage. In 1914 the daily average production ran around 730,000 bbls., and the pipeline mileage in those days was commensurately smaller.

Total gathering and trunk line mileage at the present time is about 85,000 miles—a veritable "underground railway" system. In 1914 the country's total pipeline mileage probably did not exceed 12,000 miles, but some of the main trunk line systems from the Mid-Continent fields to Chicago and east to the Atlantic Seaboard and from the Mid-Continent fields south to the Gulf Coast were established.

Invested $8,000,000

In terms of money spent, the present pipeline system represents around $800,000,000, and its establishment and maintenance constitutes a great industry in itself. The country's pipeline fabric is curiously like the railroad system. It has trunk lines, feeders, terminals, storage yards, switching systems, dispatchers, telegraph and telephone systems.

The pumping plants are complete pumping-power stations, and represent an aggregate expenditure running into the tens of millions of dollars. No estimate is obtainable as to the investment represented by pumps employed in pipeline stations, but the aggregate is very high. One estimate places the total spent in the past 15 years on Diesel engines alone for pipelines in the United States at $15,000,000.

First Line in 1865

The first successful pipeline, 4 miles in length, was laid in the oil pools of western Pennsylvania in 1865, and in 1875 a 4-inch line, 60 miles long, was laid from these oil pools to Pittsburgh. Prior to 1876 crude oil was almost entirely refined in the neighborhood of the wells, but after this time refineries were located near large consuming markets, such as Cleveland, Pittsburgh, Buffalo, Baltimore, Philadelphia, and New York, and pipelines were laid from the oil fields to these points. The development of pipeline construction increased rapidly after 1876, and by 1892 there were numerous pipelines, aggregating 3,000 miles in length, mostly 5 and 6 inches in diameter, connecting the oil pools of western Pennsylvania with refineries located in the larger cities of Ohio, Pennsylvania, Maryland, New Jersey and New York.

The economy of pipeline transportation of crude oil had been thoroughly established long before crude oil was discovered in the Mid-Continent Field. In 1903 and 1904, after a substantial production had been obtained in southeastern Kansas and northeastern Oklahoma, the development of a large pipeline system in this field began. By the end of 1914 the trunk line mileage of the five large interstate systems alone equaled about 4,320 miles of continuous line, while the total mileage of trunk lines operated by them was about 6,590 miles.

Building a Line

Building a pipeline, like constructing a railroad, involves first a survey of the route with regard to grades, stream crossings and the like. But a railroad seeks the cities in order to get business, while the pipeline avoids towns to save expense.

A feasible survey being made, right of way is secured by purchase or long-time easements. Then gangs of men distribute the pipe and join it into a continuous line. This joining is done before the pipe is lowered into the trench that meanwhile has been dug for it, largely by great power ditching machines. Finally, the jointed pipe is lowered into the trench and buried, commonly about 18 inches, but deeper in cold regions.

Under railroad lines a double pipe is used; the inner is the pipeline proper, while the outer and much larger one is designed to catch the petroleum in case of leakages and guard against fires. At large streams the pipe may be jointed together on the ice in winter, and then lowered through a trench in the ice to the river's bed. In summer it is jointed on flatboats and strung across the river from them, much as ocean cables are laid. The pipe lies on the river bottom, anchored by huge clamps at the joints, weighing about 1,000 pounds each, to prevent drifting.

According to desired capacity, the pipe may be 4, 6, 8, 10 or 12 inches in diameter, or even larger. While the pipe is being laid, pumping stations are erected to push the petroleum along. Commonly these are about 40 miles apart, but in rough country, or for heavy and viscous oil, much closer. A pumping plant includes engines and pumps powerful enough to shove the oil along to the next station.

Preparation of the right of way includes cuts through forests, grading, bridging and the like. In soils which would corrode pipe, the latter is painted with asphalt before burying. Sometimes roads must be built before machinery can be hauled in.

Pumping Plants

The pumping plants are complete pumping-power stations, often in very isolated spots. At each station storage tanks are provided of 10,000 to 55,000 bbls. capacity, and oil is pumped directly to and from these; that is, there is not a continuous stream from one end of the system to the other, but a succession of pumpings from one storage tank to the next. A 4-inch pipeline with 800 pounds per inch pressure will deliver about 3,800 bbls. per day; a 6-inch line, 10,000 bbls.; 8-inch line, 21,000 bbls.

Pressure gauges at each pumping station immediately register any stoppages of flow or leakages. When a break is indicated, the engineer instantly telephones the next station ahead, and telegraphs the superintendent. Then the engines are reversed so as to draw the oil, by suction, away from the break. Line walkers, corresponding to the railroad's track walkers, hurry out to locate the break, and gangs are always at hand to make repairs. Because of the storage tanks at pumping stations a break does not necessitate suspension of pumping except in the section where the break occurs; all other sections go right on pumping from and to the storage tanks.

Like a railroad, a pipeline is built throughout on a uniform gauge; that is, diameter of pipe. When it is necessary to increase capacity another pipe is laid parallel to the first.

There is a chief dispatcher for the system, and local dispatchers who report regularly on pressure and movement of oil. The contents of storage tanks are regularly measured and checked against the pressure figures to determine if all the oil moving is actually getting into the tanks. Thus even the smallest leakages are detected.

The "underground railway" system of the United States transports annually half as much freight tonnage as do the railroads of France. Its mileage is twice that of all German railroads and nearly four times that of British railways.

The 85,000 miles of trunk and gathering pipelines in the United States represent over one-third the railroad mileage of this country.

THE NAME THA STANDS OUT

HO

The pictures on this page show one phase of Hope pipe line construction — operations in mountain and valley and desert, miles from any railway, where every foot of pipe must be handled over the most difficult country. Yet, in every case, the schedule of progress was maintained, unfailingly.

More than 3000 miles of Hope-built pipe lines, in all the important fields, testify to the supremacy of the Hope Company in the world of pipe line construction.

These pipe lines have been built under all conditions—in all climates—in all seasons—in all weathers—frequently against seemingly insurmountable obstacles—often under most exacting time limits.

But never has a Hope-built pipe line failed to conform to the specifications or fallen short of the complete satisfying of the company for whom it was built.

HOPE ENGINEERIN S

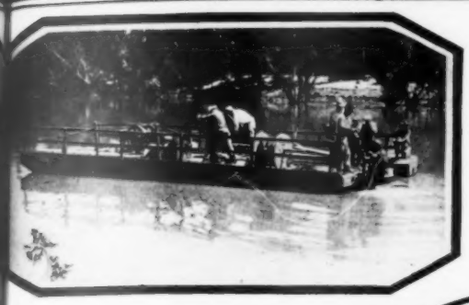
HOME OFFICE MOUNTR

DALLAS, TEXAS

Ho vice

Engineering counsel, aid in fina ign, —in pipe lines for oil and ga ping and boosting plants, gasoline re tems,

Unit ibili



HOPE

IN PIPE LINE CONSTRUCTION

And on this page still other examples are pictured, of the conditions which the Hope organization meets and conquers — marsh and swamp and forest— torrential rains and floods — submarine crossings made only with the aid of divers. But the line was laid, and delivered on time, and functioned to the satisfaction of all.

Hope Service in pipe line construction is nation-wide. The Hope organization is ever ready, with equipment and personnel to enter immediately upon any enterprise entrusted to it, and to drive it to completion in contract time.

Hope experience and resources, and the magnitude of Hope operations, enable this company to command the instant cooperation of manufacturers to whom it must look as sources of materials supply.

The Hope Company, in its activities as engineers and contractors, is unhampered by affiliations or obligations involving any other concern. It is absolutely independent in its operations.

SUPPLY COMPANY

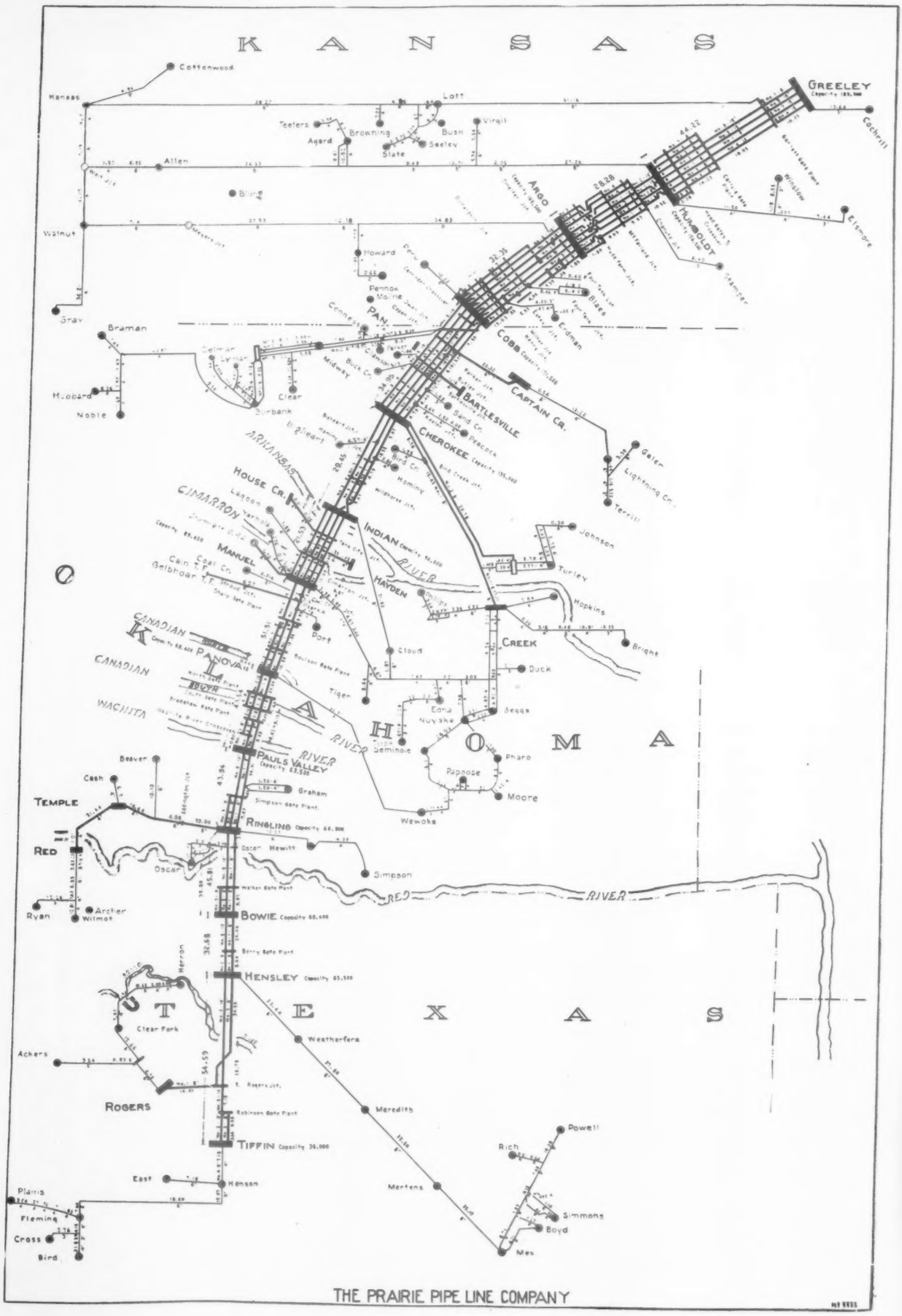
NTRNON, OHIO, U.S.A.

TULSA, OKLA.

Service

in fin ign, construction and contracting and ga ping stations, gas compressing line re tems, city and inter-city gas mains.

Unit ibility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CHEROKEE
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Peacock
Bird Cr.
Hominy
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Lightning Cr.
Terrill
ARKANSAS
HOUSE CR.
CIMARRON
Lagoon
Manuel
Coal Cr.
Cain T.P.
Gelbhoar T.P.
INDIAN
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Tiger
CANADIAN
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Eona
Nuyaka
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Seminole
Pharo
Papoose
Moore
Wewoka
PAULS VALLEY
Graham
Beaver
Cash
TEMPLE
RINGLING
Oscar
Hewitt
Simpson
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Ryan
Archer
Wilmot
BOWIE
Berry Gate Plant
HENSLEY
Clear Fork
Ackers
ROGERS
Weatherford
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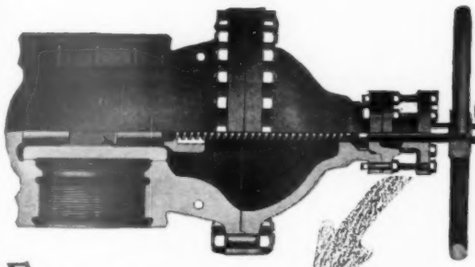
THE PRAIRIE PIPE LINE COMPANY

Sure Control



From the Wells
(Chapman Drilling Valves)

Through the Pipe Lines
(Chapman Oil Line Valves)

Throughout the Refineries
(Chapman "600" Valves)

WHETHER the problem be one of harnessing the flow at the well—or of regulating the flow through the pipe lines—or of directing the flow in the refinery—there is a Chapman Valve pre-eminently suited to the service.

Chapman designs vary to meet conditions. But Chapman Quality is unvarying and Chapman Dependability is unfailing. And Chapman resources and facilities are such that prompt delivery can always be had—usually from local stocks, always from the factory.

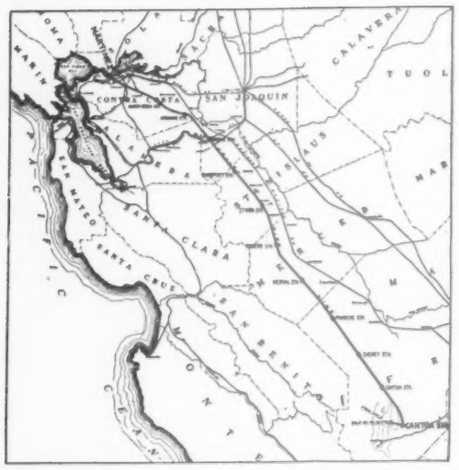
The photograph below is of the Perryman Station of the Oklahoma Pipe Line Company. The Chapman Valve in the foreground is of the type so generally preferred for pipe line control.

The Chapman Valve Manufacturing Co.
Indian Orchard, Mass.

Branch Offices: New York, Boston, Chicago, Cleveland, Detroit, Houston, Atlanta, Tulsa, Syracuse, Pittsburgh, Philadelphia, San Francisco, Los Angeles.

CHAPMAN VALVES

Positive Protection for Pipe Lines



Showing the location of the Valley Pipe Line

The protection afforded by Bitumastic Enamel has been clearly shown by the recent inspection of this pipe line, laid eleven years ago in the highly corrosive soil of the San Joaquin Valley.

THE efficiency of BITUMASTIC ENAMEL in the protection of oil lines and gas mains was shown by a recent inspection of the Valley Pipe Line, which extends for a distance of 170 miles through the highly corrosive alkaline soils lying between Martinez and Coalinga, California.

This line, owned by the Shell Oil Company of California, was coated with BITUMASTIC ENAMEL in 1914-15. It was examined in May, 1926, at 58 widely separated points, all of which were known to be subject to the most severe corrosive conditions. With the exception of a few imperfections due to the former method of brush application, the BITUMASTIC ENAMEL was found to be in excellent condition. Engineers familiar with the region state that this constitutes a record for the protection of steel pipe laid in corrosive soils.

The results shown by this examination have proven so convincing that several contracts have been placed with us for furnishing and applying BITUMASTIC ENAMEL on other lines.

One of these is the 250-mile 8″ oil line now being laid by the Ozark Pipe Line Corporation between Roxana, Ill., and Hammond, Ind.

Another is the 85 miles of 22″ natural gas line between Natchez, Miss., and Baton Rouge, La., which is being laid by Ford, Bacon & Davis, Inc.

We are prepared to handle pipe line work in three ways:

(1) contract to furnish and apply the materials;
(2) furnish materials and supervise the application;
(3) furnish materials only.

Send for our new book

"The Protection of Pipe Lines"

BITUMASTIC

REG. U. S. PAT. OFF.

WAILES DOVE-HERMISTON CORPORATION
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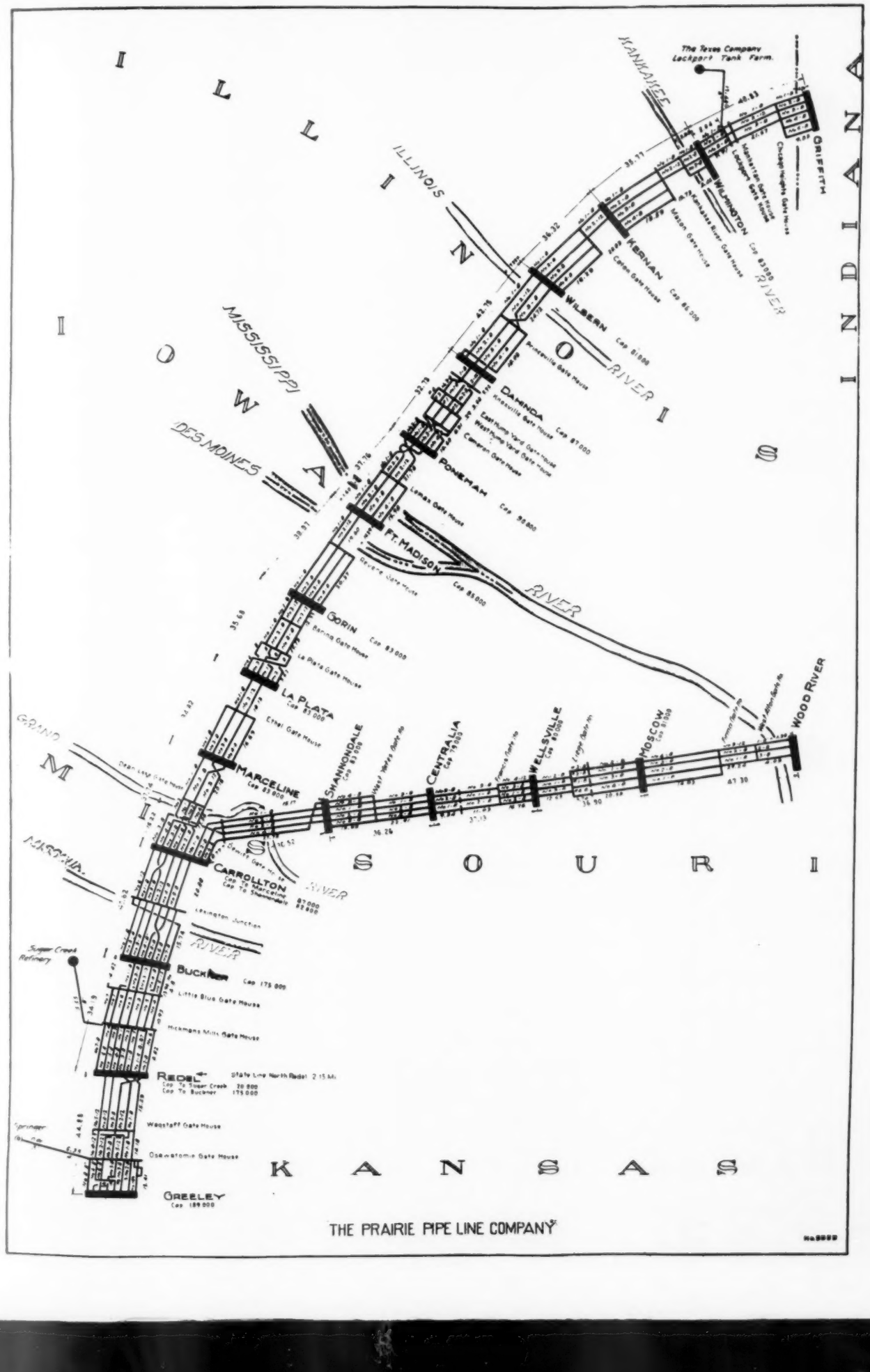
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The Texas Company Lockport Tank Farm
GRIFFITH
WILMINGTON
HERNAN
WILBERN
DANNOA
POINEMAH
FT. MADISON
GORIN
LA PLATA
MARCELINE
SHANNONDALE
CENTRALIA
WELLSVILLE
MOSCOW
WOOD RIVER
CARROLLTON
Sugar Creek Refinery
BUCKNER
REDEL
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Cap 95800
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THE PRAIRIE PIPE LINE COMPANY

Getting Right of Way Is No Easy Job

Real Diplomacy Required of Agent Who Must Get Permits From Many Authorities. Pipeline Companies Liberal

By Andrew M. Rowley

Not all the best diplomats in the United States are representing this nation abroad. Many of them are connected with the right of way and claims departments of the big pipeline companies. If there is any business which requires that a man be 57 kinds of an expert, it is that of procuring easements, or the right of way, for a pipeline company and then satisfying everyone regarding his claim for damages after the line has been laid.

If anyone in the petroleum industry thinks that after a pipeline company decides to construct a line between two points all the right of way man has to do is to take his blank forms and have the persons living along the proposed route sign on the dotted line, that person could spend a most interesting and profitable time with J. S. Gibson, manager of the right of way and claims department of the Prairie Pipe Line Co. or any other right of way man in any other pipeline company. Mr. Gibson or the other right of way men would soon convince anyone that Talleyrand, Napoleon's prime minister, must have learned diplomacy from being a right of way or damage man.

Must Be Versatile

The chief requisites of a right of way man are that he be a keen judge of human nature, that he be able to talk intelligently with those with whom he deals on subjects familiar to them, and that he be able to sense the exact psychological moment to present the contract to be signed. Of course he must be honest and above board in his dealings for it is the unalterable policy of every pipeline company to make friends with and create good will among those with whom it does business.

When an extension of an existing pipeline system is decided upon, it is first necessary to obtain authority for the company to do business within the state to be entered and to procure from the proper authorities of the state, counties, cities and towns en route permits for the crossing of the many roads, streets and alleys. Obtaining these necessary permits and franchises is a big job. Aside from those mentioned as being necessary from the state, cities and towns, permits have to be procured from railroads where the pipeline crosses those lines; from the Secretary of War of the United States where it is necessary to lay a line across a navigable stream; from the commissioners of a levee or drainage district where the line traverses such a district; from the state where state school lands are involved; from commissioners of public parks or forest reserves where the line goes through such places, from the Indian agent and the Secretary of the Interior where lands of restricted Indians must be crossed; and where the land is owned by a minor, a contract must be made with the guardian and the approval of the probate court procured. In all cases contracts with owners must have the acknowledgement of a notary.

Many Persons to Be Seen

In case the land to be crossed is mortgaged, the holder of the mortgage must be seen in addition to the owner. All right of way contracts are filed for record, the same as deeds, although the right of way is merely an easement to place the pipe across the property, underground.

When it is considered that there is an average of five property owners to the mile and that only half the property owners reside on the land they own, the number of persons who must be seen before a right of way easement can be procured is easily figured. For instance, the Prairie Pipe Line Co. has 11,200 miles of pipeline in its system. While much of the trunk line has as high as eight lines of pipe, right of way had to be procured for each line, consequently it was necessary for the right of way department of the Prairie Pipe Line Co. to see 84,000 persons before that right of way was procured.

Of the half of the owners who do not reside on the land they own and over which it is desired to procure easements, one-third live at a considerable distance from the vicinity of the line. (These figures and averages were obtained from pipeline records of a large company dating over many years and may be considered as accurate for practically all pipeline companies.) It has been necessary to procure contracts from persons residing in China, and in practically every foreign country and United States consuls in nearly every country in the world have been called upon many times to have the property owners appear before them to execute contracts for right of way for pipelines in this country.

Right of Eminent Domain

The right of way contract simply gives the pipeline company permission to lay a pipeline across the property at a depth, usually of 20 inches below the surface of the ground, the top of the pipe being that depth underground. It also provides that the pipeline company shall adjust all damage which the property owners may sustain by reason of the construction and operation of the pipeline.

The purchase of rights of way usually begins immediately after the survey of the line has started. Ordinarily a few of the company's regular right of way men are used to form the nucleus of the temporary organization needed to enable the work of buying rights of way to proceed at approximately the same speed as the survey of the route. Most of the major pipeline companies operate as common carries which enables them, when necessary, to acquire by condemnation such portions of the right of way as they may be unable to obtain otherwise, but this method is very seldom resorted to as a fair price is always offered for the easement itself, in addition to the money paid out for damages incurred in the construction or operation of the line.

Liberal in Settlements

Because of the nature of the pipeline company's business, it often is quite difficult to procure easements across properties. A pipeline company does not bring any business to a community and it does not serve that community directly in any way. It does not transport products of that area to market as does a railroad and residents of that section cannot bring material or products into their vicinity by the pipeline as they can by the railroad.

By reason of this fact and because it is desired to leave a friendly feeling all along the way, the pipeline companies are quite liberal in their dealings with property owners along the route of a line. If property owners are friendly to a company they can save that company thousands of dollars at times. Suppose a farmer is plowing and notices an oil seepage beginning in his field where a pipeline crosses the field. If that farmer be friendly to the company and notify it immediately, the company can have a gang of men on the spot quickly to repair the leak which is starting in the line, thereby saving thousands of dollars in oil which might have been lost before the leak would have been discovered from the station gauges, besides the loss in damage which would have been done to the property by the oil.

As an illustration of the attitude of a pipeline company in its business with property owners is the case of John Darwin of a small town in Missouri. The pipeline company had its line surveyed through the vicinity of this to town but found the property owners united against granting a right of way. The right of way agent soon found that the most influential man in the town was a business man named John Darwin who owned a grain elevator near the railroad station. On this elevator in big letters was the sign "John Darwin Flat." The agent went to see Mr. Darwin, a man about 80 years old and found him violently opposed to granting any right of way to a pipeline company. Mr. Darwin said he would not give $10 an acre for any farm in Missouri which had a pipeline crossing it and things looked dark for the agent.

In Business Alone

The right of way man began to discuss crop conditions, with which he was entirely familiar, and he asked Mr. Darwin what the "Flat" meant on his sign.

"Why it means just 'flat,' said Mr. Darwin. "It is not 'John Darwin and Son,' or 'John Darwin & Co.' or 'John Darwin and Brother,' it is just 'John Darwin Flat' ".

It developed Mr. Darwin had been a victim of an unscrupulous partner in his early life and he wanted everyone to know there was no person connected with his business except himself. He claimed he was the only absolutely honest man in the world and all residents of the community vouched for the fact he was "as straight and honest he leaned backward."

Little progress was made on the right of way matter that day as Mr. Darwin refused to discuss it and the whole conversation was on crop conditions, prices of farm products and experiences Mr. Darwin had had during his business career of more than 60 years.

The next morning the right of way agent found the old gentleman cutting weeds near his elevator. The agent sought to help the old man and said he would cut the weeds. After working for an hour at the job, Mr. Darwin suddenly said: "Come on over to the bank and I'll sign those papers."

Mr. Darwin consulted his banker and finally said the contract must provide that he (Darwin) would have the privilege of assessing all damages to his property by reason of the building and operation of the pipeline, during his lifetime. The agent finally got the old man to consent to insert the word "reasonable" before damages and the contract was signed for a certain amount per rod of right of way.

Refused Extra Money

With the signing of the contract by Mr. Darwin, the other residents of the community signed up quickly but the agent was forced to pay them a higher rate per rod than Darwin had received. When all the contracts had been signed, the agent figured Mr. Darwin's right of way at the same rate as had been paid other residents and made out another check for the difference. He took it to the old man and told him the other residents had been paid more and it was the policy of the pipeline company to pay everyone the same amount as it was good business and prevented friction among neighbors.

Mr. Darwin refused to accept the check. He said he had been paid all the right of way was worth and the other residents had received more than they were entitled to. The agent insisted on his taking the check and finally succeeded in getting Mr. Darwin to accept it but only with the proviso that the check be given to the church in the town which was holding a bazaar at the time. Darwin gave the check to the church telling them he was not entitled to it.

Despite the fact the pipeline was in operation across Mr. Darwin's property

(Continued on Page C-190)

ILLINOIS FARMER IN A CLASS BY HIMSELF WHEN IT COMES TO TRAINING DECOY DUCKS

One claim agent of a major pipeline company is thoroughly convinced a certain farmer in the drainage district of Illinois missed his calling and that any big circus in the country would gladly pay this farmer big money for his services as a trainer. This district in Illinois is famous for duck hunting and most of the residents there have quite a number of decoy ducks which they have trained to swim around a boat or blind and attract the more migratory and wilder species.

A pipeline extending through the district developed a bad leak and considerable crude oil escaped, covering much of the water in a certain vicinity and killing quite a number of decoy ducks. The claim agent visited the farmers and had little or no difficulty in settling the damages at the rate of about 40 cents per duck. Everything was going along finely and he was about to complete his work with the visit to one man who had lost 12 decoys as a result of the break in the pipeline.

Imagine the consternation of the claim agent when the farmer presented a bill for $120 for the 12 ducks or at the rate of $10 each. When he regained his power of speech he made some remark about crude oil not being harmful to gold ducks, etc., but the farmer merely smiled and insisted the bill was correct.

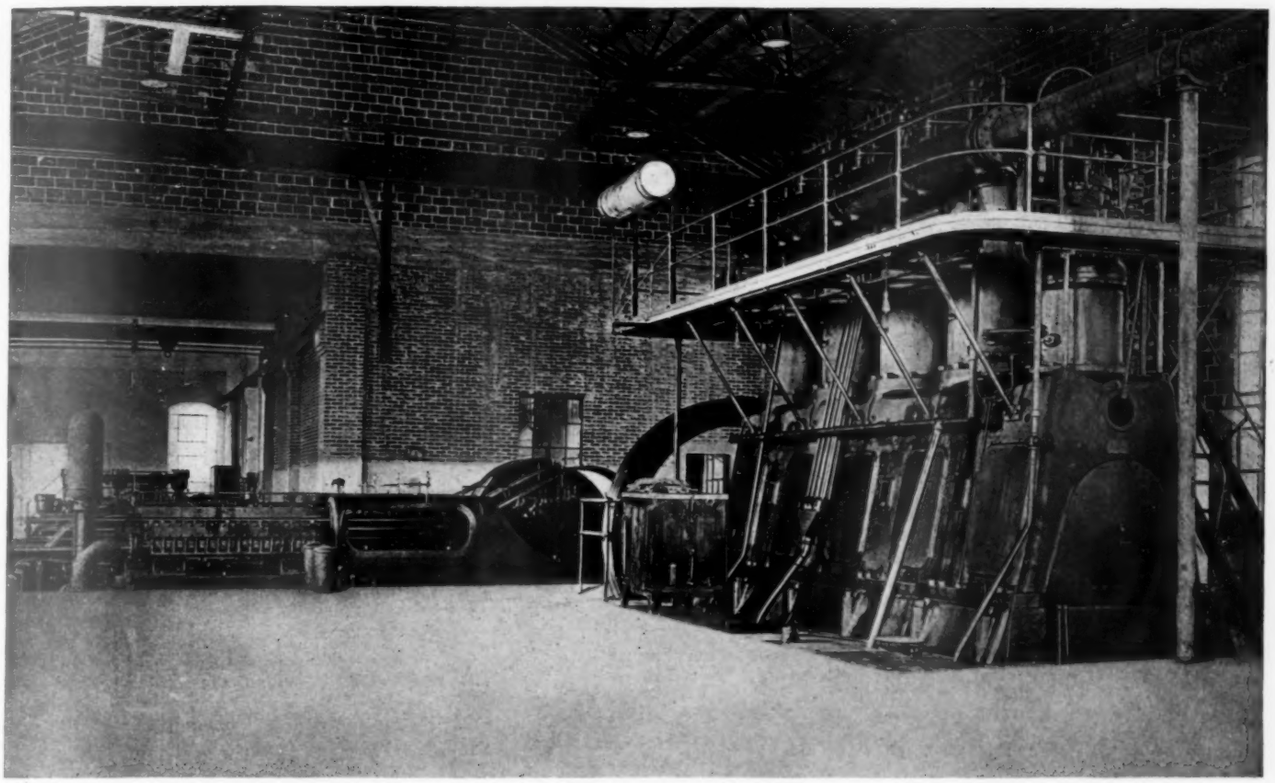
"But such a price is out of all reason," exclaimed the claim agent. "Why I have just settled with all of your neighbors and paid them 40 cents apiece for the decoys they lost. How do you get this idea about yours being worth $10 each?"

"Well, my ducks were especially trained," said the farmer. "All those other decoys that were lost and for which you paid 40 cents each were all right in their way but they were not trained to protect themselves and they were liable to get shot by hunters. My decoys never would get shot so I could keep them a whole lot longer."

"How is that?" asked the claim agent.

"Well, you see the ordinary decoy duck just swims around the boat or blind," said the farmer, "and when a bunch of wild ducks settle near them it is hard to tell which is a decoy and which is not, and a fellow is liable to shoot the decoys. My ducks were different. When they attracted the attention of the wild ducks and got them to settle on the water near a blind, my ducks then watched the blind and whenever they saw the muzzle of a gun pushed through the blind they dived under the water so they were out of sight when the shooting was going on."

The claim agent was not convinced but after he had been told the same story by all the other farmers in the vicinity he saw the cards were stacked against him and he had nothing to do but fork over the $120.



665 B.h.p. Diesel Engine driving high-pressure oil pipe line pump through gears. In regular service since 1920.

Diesel power protects the pumping station owner against errors in apparatus selection, layout and operation

BY SHIFTING responsibility for over-all plant efficiency largely onto the shoulders of the engine builder, Diesel power simplifies station design and protects the owner from serious losses at the hands of careless or incompetent operatives.

A steam plant may be handicapped from the start by wrong selection of integral parts or wrong proportioning or installation with reference to each other. In service, good performance requires good judgment in adjusting draft, firing the fuel, maintaining clean heat transmission surfaces, recovering waste heat, maintaining even steam pressure and superheat, preventing excessive line condensation, keeping the condenser vacuum efficient, etc. Design adjustments and operating procedure all involve skill. If performance is impaired by whims, personal preferences or carelessness, the trouble is hard to find except for the greater amount of fuel burned, and the remedy may involve perplexing problems.

In contrast, the Diesel engine is a fixed-performance unit, simple to select for given work and leaving little to the operator's judgment. The amount of air entering the cylinders cannot be altered. The fuel rate per horsepower-hour is fixed in the design and *permanent* regardless of the age of the engine. The amount of fuel entering the cylinders is controlled by the governor to exactly meet the speed and load requirements, and there is no chance for waste.

Being in itself a complete and self-contained power plant, the Diesel engine puts the responsibility squarely up to one builder, and his guarantees are easy to check. There can be none of the controversies that arise in a steam plant where the tests are intricate and open to error, and where the builder of one piece of apparatus tries to "pass the buck" to another.

There are so many other interesting angles to the Diesel proposition, that you ought to be well posted. If you will tell us how much steam power and what pumps you now use, and at what cost for fuel and maintenance, our Engineers will show you how attractive savings and service improvements could be made.

BY INVITATION MEMBER OF

NEW YORK, U.S.A.

McINTOSH & SEYMOUR
CORPORATION
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McINTOSH & SEYMOUR DIESEL ENGINES

For Complete
PIPE LINE UNITS

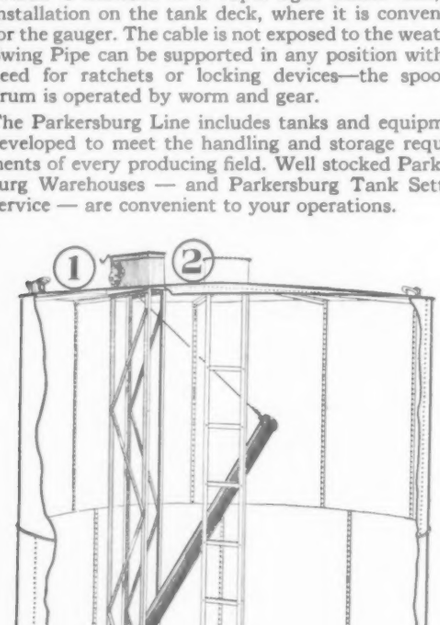
PARKERSBURG Bolted Steel Tanks with Swing Pipe Mechanisms are economical units for pipe line storage. These units can be supplied completely equipped with vapor-tight fixtures for prevention of losses through evaporation.

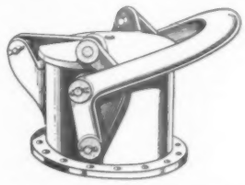
Parkersburg Swing Pipe Mechanisms can be applied to any steel tanks—any make or size—to a farm of 55's, a battery of Parkersburg Bolted, or to any other tanks made from lighter gauge plates or sheets.

Swing Joint does not depend upon side sheets for rigidity. It is self-supporting, and will not sag, twist or bind.

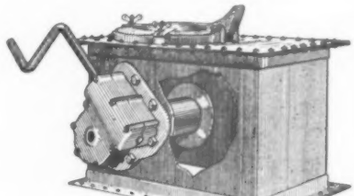
Winch is enclosed in a vapor-tight Hatch Box, for installation on the tank deck, where it is convenient for the gauger. The cable is not exposed to the weather. Swing Pipe can be supported in any position without need for ratchets or locking devices—the spooling drum is operated by worm and gear.

The Parkersburg Line includes tanks and equipment developed to meet the handling and storage requirements of every producing field. Well stocked Parkersburg Warehouses — and Parkersburg Tank Setting Service — are convenient to your operations.

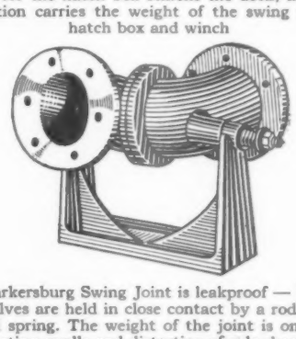




1 The Parkersburg Self-Clamping Gauge Hole Covers stay closed, tightly sealed by the weight of the lever. These covers are recommended for flow, lease or stock tanks, and for high or low pressures



2 Parkersburg Hatch Box encloses the spool and cable. There are no stuffing boxes, the hatch box is bolted directly to the tank deck. Swing Pipe is held in any position — drum is turned by a worm and gear. Lattice column support for the hatch box stiffens the deck, and in addition carries the weight of the swing pipe, hatch box and winch



3 Parkersburg Swing Joint is leakproof — both halves are held in close contact by a rod and coiled spring. The weight of the joint is on the supporting cradle and distortion of side sheets of tank is obviated by freedom from this strain. Side sheets are not twisted—and won't sag—the weight of the swing joint is carried by a supporting cradle

Ask nearest Parkersburg Representative to give you details and specifications

The Parkersburg Rig & Reel Company

Main Office and Works, Parkersburg, W. Va.

Efficient Transportation Aids Business

$1,650,000,000 Invested to Carry Products to Markets, Resulting in Reducing Prices of Necessities.

By L. M. Fanning
New York Bureau, The Oil and Gas Journal, 30 Church Street, New York

No single factor in the development of the petroleum industry has been more important in giving the world low cost power, light, heat and lubrication, than efficient transportation.

From the producing field to the refinery, crude oil moves with an ease and freedom not duplicated in the handling of any other commodity. The flow through the refinery, the refining processes themselves, constitute no interruption to the continuous movement, and there is even a minimum handling in the marketing of the refined products when they leave the refinery.

Probably the two most important elements which are fundamental in petroleum today are:

First, meeting tremendous requirements and getting the great volume of products to the consuming markets.

Second, supplying low-priced products.

It is obvious that transportation must rank with production itself in its outstanding relation to these fundamental conditions.

Linked With Production

While in certain corporate respects the transportation of petroleum is a separate activity, this applying principally to trunk pipeline ownership and control, the vital relation that transportation bears to production, refining and marketing has resulted in the development as distinctly a part of oil enterprise.

As the needs arose the most effective means of transportation were devised by those closest to the petroleum industry. As methods changed, the oil companies, which were chiefly concerned, devised ways of protecting their investment in production and refining by extending their own or allied investment in transportation facilities.

The petroleum industry, therefore, logically embraces the following major fields of activity: Production, refining, transportation and marketing.

It is probably more self-reliant than other industries in the matter of the carriage of its raw and finished products. It has its own gathering lines connecting with the oil wells. Closely affiliated companies operate trunk pipelines carrying the crude oil from the field to the refinery.

Tankcars and Tankers

It owns practically all, or leases from concerns having this as their sole source of activity, the tankcars in petroleum service, the railroads not having to furnish this equipment. The control of this equipment operates toward an efficient rail movement of tankcars under the direct supervision of the shipping oil company.

The petroleum industry has its own tank vessels. These carrying crude oil from coastal terminals to refineries, and finished products from refineries to the world's markets, it directly operates and thus supervises the movement of oil practically from the remotest oil field to market outposts.

Another of the principal transportation methods is motor truck transportation. The horse-drawn tank truck became familiar with the movement of kerosene to wayside stores and country houses, but, with the growth of the automobile and the necessity for widespread, quantity distribution of gasoline, the tank truck came into its own and now fills a vital need. Large fleets of motor tank trucks are operated by practically all oil companies engaged in the gasoline business.

To provide these various transportation agencies in sufficient supply and in continuous efficient operation, the petroleum industry has invested hundreds of millions of dollars. Transportation now probably represents $1,650,000,000 in invested capital.

Big Total Investment

The total investment in the oil business is some $9,500,000,000, the greatest item being production, representing about $4,500,000,000. There is an investment of about $2,500,000,000 in refineries. Marketing, excluding tank trucks, probably totals $850,000,000.

Transportation, with $1,650,000,000, represents 17 per cent of the total investment in the oil business. Roughly segregated, the investment in the various branches of transportation is estimated as follows:

Pipelines	$ 800,000,000
Tank steamers	460,000,000
Tankcars	200,000,000
Tank trucks	100,000,000
Total	$1,650,000,000

The oil industry's yearly expenditure for transportation — pipelines, tankcars, tankers and tank trucks—probably totals about one-quarter of a billion dollars.

The pipeline as a practical factor in oil is readily recognized. It permits the flow of the commodity in an ideal way, and the network of gathering and trunk lines in this country represents some 85,000 miles, over one-third of the railroad mileage of this country, and illustrative of the extent to which this method has been adopted.

Handle 2,000,000 Bbls. Daily

As practically all the crude oil produced at one time finds its way into a pipeline, there is a daily handling of something like 2,000,000 bbls. of oil, some moving only for a short distance into field tanks and some traveling at the rate of a few miles an hour constantly through the trunk line and arriving ultimately at a point as far as 1,700 miles away from the point of original shipment.

To move this quantity of oil by rail in tankcars, if added to the present movement of refined products, would require at least double the present investment in tank cars and even then would fail to provide the steady, uninterrupted movement of the pipeline system, without which the petroleum industry as it exists today could not function.

Retardation of flow could only mean greatly increased cost of petroleum products.

Crude oil moves principally by pipeline, or by a combination of pipeline and tank steamer. A simple comparison of transportation costs is all that is sufficient to show how pipeline and tanker transportation operate to keep down the cost of petroleum products.

Cost of Moving Crude

The cost to move Mid-Continent crude oil to the Atlantic Seaboard compares as follows, at the date this is written:

(a) By pipeline:

Trunk line rate	$ .76¾
Gathering charge	.20
Handling charge	.10
Total	$1.06¾

(b) By water:

Pipeline to Gulf Coast	$ .67¼
Gathering charge	.20
Boat to Atlantic Seaboard	.30
Total	$1.17¼

(c) By railroad in tankcar:
About $2 a barrel.

First Among Rail Shippers

While the pipeline is the principal transportation medium for crude oil, refined products are moved chiefly by rail. Thus, the petroleum industry besides as a purchaser of equipment originating a great volume of freight for the railroads, contributes directly to the prosperity of the railroads in being one of the ranking shippers.

The movement of crude oil by railroads during 1925 totaled 11,245,000 tons.

The petroleum industry ranks first among rail shippers of manufactures. During 1925 refined oil tonnage originating on rail lines totaled 46,273,000 tons, exceeding all other single classes of commodities by a big margin. This tonnage represents 16 per cent of the total movement by manufacturing industries, amounting to 285,245,000 tons.

A comparison of refined oil movement with other products follows:

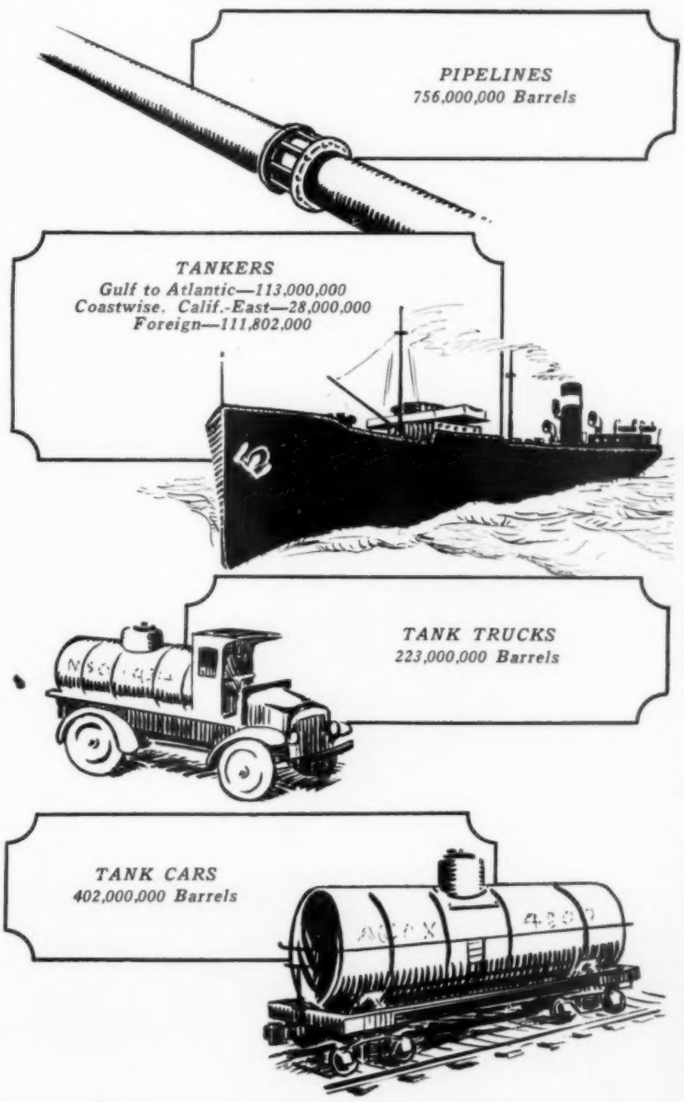
	Tons
Refined petroleum	46,273,181
Bar and sheet iron, structural iron and iron pipe	39,143,747
Cement	24,516,325
Brick and artificial stone	19,660,854
Iron, pig and bloom	14,576,820
Chemicals and explosives	9,579,028
Fertilizers	8,462,885
Automobiles and auto parts	6,969,800

Tank Ship Important

It will be noted that the petroleum industry is responsible for the volume of the movement in several of the classifications listed. For instance, probably the largest part of the movement of structural iron and iron pipe comes from oil country purchases; likewise petroleum industry buying affects favorably the shipments of chemicals and automobiles.

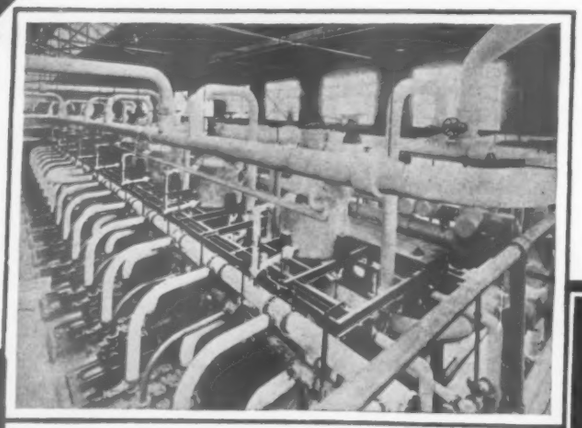
The part the tankship is playing in petroleum transportation is becoming more and more important. In the coastwise movement of crude oil between California and eastern ports and between the Gulf Coast and the Atlantic Coast, the tank vessel moves so continuously and steadily that it constitutes a marine pipeline. In the latter movement, the tanker has competed to advantage with the trunk pipelines and diverted the flow in a serious way, from a pipeline transportation standpoint. The tank vessel also brings

VOLUME OF ANNUAL OIL MOVEMENT



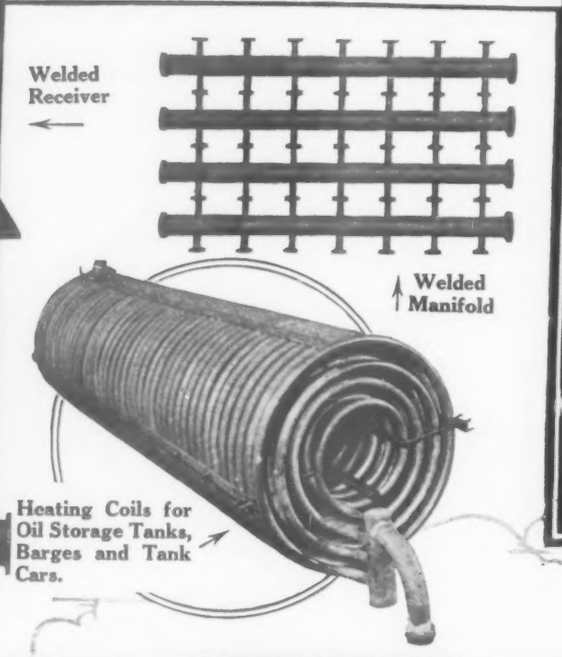
Put Your Piping Problems up to Power

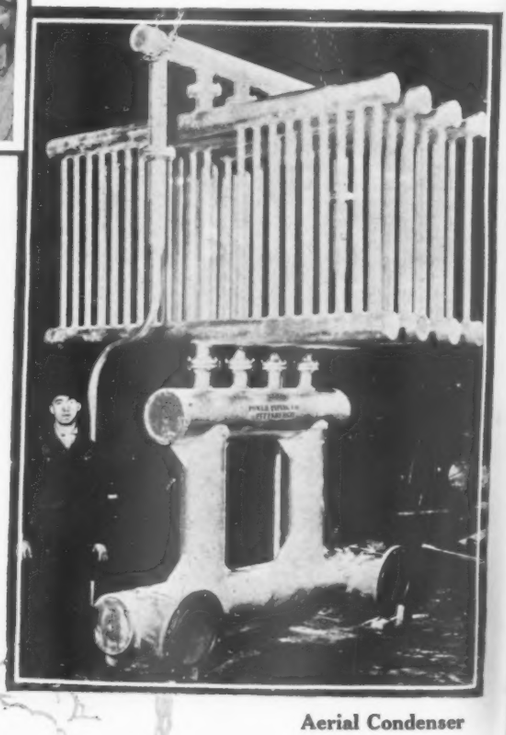
An absorber for extracting gasoline from natural gas.



A general installation for oil pump stations.

THIS page shows the many varied phases of Power Piping Company services to the oil industry. It is a service that is completed and adapted individually to the problems in question. Experience, skill and personnel serve as an accurate guide to the solution of any problem encountered. Put it up to "Power Piping."





Aerial Condenser

Plant of Power Piping Co.

Piping For Producing, Transporting and Refining

for producing, transporting and refining

In any field—producing, refining or transporting—problems come up that demand special treatment. Whether the work be simple or complex, we can help you. We design, erect, construct, assemble or supervise—and we specialize particularly in constructing coils, absorbers, heaters, exchangers, condensers, manifolds and the many details connected with production or transportation. Put it up to "Power Piping."

Piping for Steel Barges

The illustrations show operations on barges constructed by a large steel company in the Pittsburgh District, on which we were selected as the piping contractors.

STEEL Barges are an important and ever-increasing development in transportation. In the special piping required for these barges, Power Piping Company has played an impressive part. We have furnished and erected complete piping for no less than forty oil cargo barges. Put it up to "Power Piping."

We welcome inquiries on any piping problem related to the industry, with the assurance that satisfactory and economical service will follow!

Power Piping Company—

829 Beaver Ave., N. S., Pittsburgh, Pa.

Mexican, Venezuelan, Peruvian and Colombian crude oil to American refineries.

The other major function of the tank vessel is in moving refined products from refineries to domestic and foreign markets. The greater part of the export movement is bulk shipment in tank steamers, although there is a large volume of cased gasoline, kerosene and lubricating oils moved by cargo vessels.

Annual Oil Movement

The annual movement of oil by tank vessels, excluding imports, constitutes in the total American merchant marine tonnage aggregating 14,208,000 tons, tank vessels comprise 5,157,000 tons, or 36 per cent.

While principal reference has been made to petroleum shipments in bulk by tank steamers, it is also true that the movement of cased goods by cargo vessels is important and that petroleum contributes largely to the prosperity of shipping generally.

In the export trade, petroleum is an important factor working for a favorable trade balance for this country. Total exports of domestic merchandise from the United States in 1925 were valued at $4,818,271,000. Crude petroleum and petroleum products contributed $445,502,000, amounting to over 9 per cent of the total.

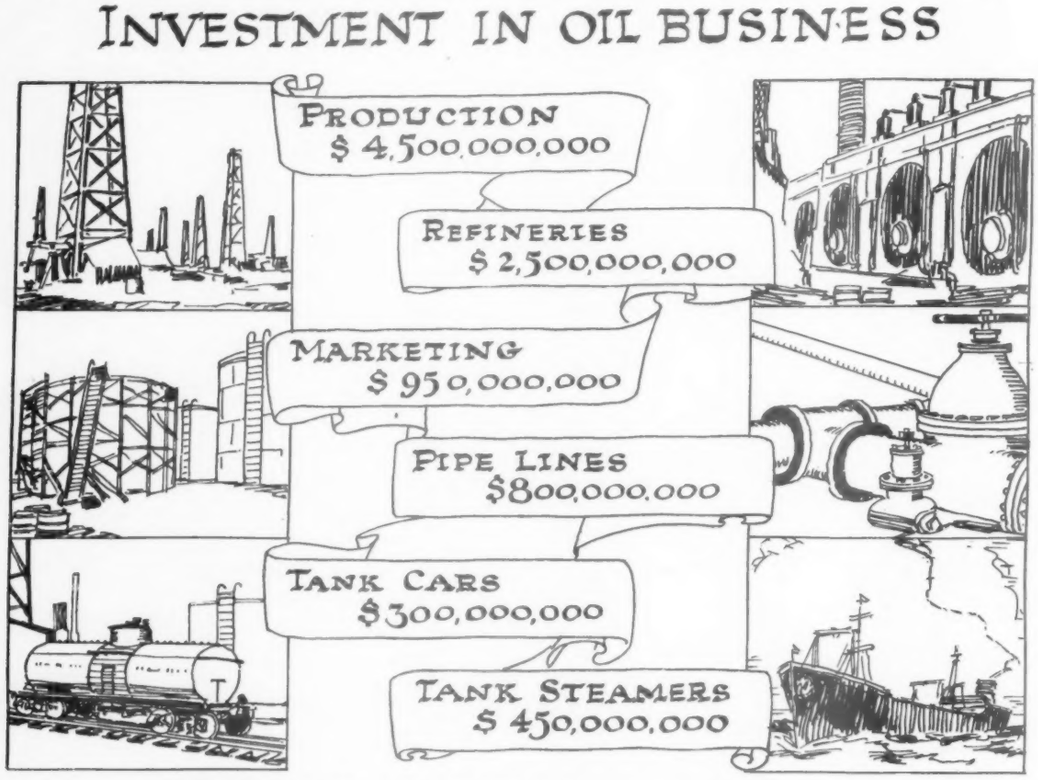
Big Export Business

Exports of unmanufactured cotton totaled $1,059,751,000, and other leading exports were animal and animal products, $451,652,000; machinery, $385,377,000; grains and preparations of grain, $351,789,000; vehicles, $334,462,000; iron and steel, $223,618,600; wood and paper, $197,584,000, and chemicals and allied products, $124,455,000.

Of the total mineral oil exports, crude oil in 1925 amounted to $24,275,000, and refined products aggregated in value $421,227,000, divided as follows:

Value of Exports of Refined Petroleum, 1925	
Gasoline	$197,797,000
Kerosene	83,525,000
Gas and fuel oils	49,045,000
Lubricating oils	91,060,000

The importance of petroleum to the country's prosperity is further emphasized when it is considered that the petroleum industry is the greatest shipper of manufactured products to foreign countries. The exports of refined products, as shown, totaled in 1925 $421,227,000. Further classifying some of the leading export articles, it is shown that the value of exports of automobiles, parts, etc., totaled $303,106,000, or 6.3 per cent of the total value; leaf tobacco, $153,788,000, or 3.2 per cent; wheat, $148,717,000, or 3.1 per cent, and refined copper $140,221,000, or 2.9 per cent.



combined volume 33 per cent of the total quantity of oil produced in this country. Separated by principal trade routes, the movement for 1925 is shown as follows:

	Total oil moved principally by tanker, 1925 (Bbls.)
Coastwise:	
California-East	28,000,000
Gulf Coast to Atlantic Coast	113,000,000
Imports	78,201,000
Exports	111,802,000

The petroleum industry has done probably more than any one industry to put an American merchant marine on the seven seas, and it is significant that of

Claim Agent Learns Farmers Could Pay Public Debt Easily

Men employed in the claims departments of the various pipeline companies could give many pointers to politicians who are worrying about the farm relief bills and other measures to aid the farmers. The railroads have been convinced for a long time that the only cows ever killed by trains are pure-bred Jerseys, but it remained for the pipeline men who visit farmers to settle claims for damages due to construction and operation of pipelines to get the real low-down on conditions affecting crops.

One of the right of way and claims men located in Texas wrote last week to the manager of the department, as follows:

"Buying right of way is a cinch compared to settling damages. I left east Texas this week because I am tired of hearing people bellyache. I have looked at cotton, corn, maize, oats, high gear, sorghum and other crops and heard the merits of each crop extolled until I firmly believe that there is no need of a farm relief bill being passed by Congress, for if the farmers of Texas can raise half as much as they claim and get half the price they say they can, the farmers can pay off the national debt in a couple of years and then buy up all the oil companies."

This same man had just left a section where the company had laid a line across a farm. The agent inspected the property after the line was laid and decided no damage whatever had been done as the farm was not being worked and everything had been allowed to run down. However, the agent visited the little shack where the owner lived and when he saw the pitiful circumstances under which the family was living he decided to do some charity work and give the family $5. He learned from a little ragged girl the father was in the woods hunting. When he told the child who he was the little girl said: "Oh! Papa has been waiting for you and as soon as you pay him his damages he is going to buy an automobile."

Much of the property in that vicinity is owned by negroes. The agent approached one old darky who owned a cotton field and told him the company wanted to construct a pipeline across the field but would pay him for all damages incurred. The old man evidently had heard that some of his neighbors were contentious, for he straightened up and said: "Yes, sir, white folks. That am all right. I'ee not a bit contagious about anything like this."

THE REFINERY IS THE MARKETING END OF A CRUDE OIL PIPELINE

The Richmond refinery of the Standard Oil Co. of California, which is the northern terminal of that company's pipeline system

We are in position to make prompt deliveries from either our Beaumont or Houston stocks for almost any requirement for the oil industry, whether it be production, pipe line, or for refinery use. Our stocks are very complete in all classes of tubular goods, Valves, Fittings, Packing, Drill Hose, Wire and Manila Rope, Tools, etc. Your inquiries will have our prompt attention.

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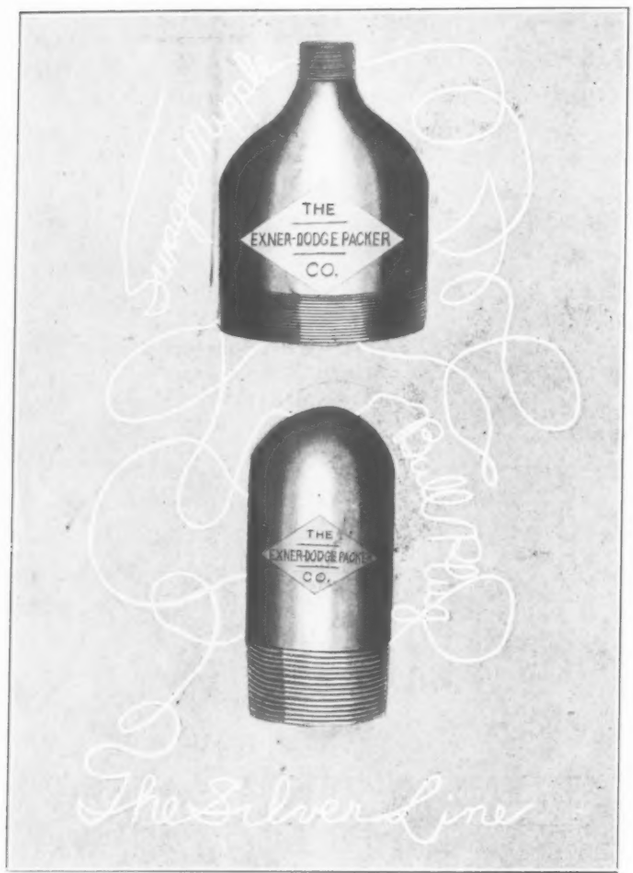
THE SILVER LINE

Swaged nipple, whose superior materials, exact machining and rigid inspection bring to you the real service of

THE SILVER LINE



Bull plug, whose stout nose and clean, rust-proof threads insure to you the service demanded of the products of

THE SILVER LINE

Leaks Are Stopped

by the quality that permeates the products of THE SILVER LINE. This quality is the essence of THE SILVER LINE. It is your guarantee of excellent materials, thorough workmanship and satisfying service.

No SILVER LINE swaged nipple or bull plug has ever been known to leak. The high grade materials, the fine details of manufacture—the elimination of burrs, the prevention of rust on threads, the machining to exact dimensions, the painstaking inspections—all guarantee satisfaction to you.

Ask by name for the products of THE SILVER LINE.

Write for our catalogue.

Exner-Dodge Packer Company

Coffeyville, Kansas

Some Features of a Pipeline System

Pipe, Manifolds, Machinery and All Equipment Must Be of Highest Quality to Withstand Constant Strain

The business of a pipeline company is to collect crude oil from the many remote places where it is produced and to deliver it to terminal points hundreds of miles away. Stretching out like the tentacles of an octopus, the lines of a gathering system collect the crude oil and feed the trunk line system of large pipes that span the country in rather direct courses to distant terminal points.

Early in the history of the oil industry, refineries were located near the source of production, but as the products of petroleum became varied and the demand great, refineries were located strategically in the market centers. Some refineries were located to serve the domestic demand of a certain region, while others were located for serving the export trade as well as the domestic demand. The location of refineries near market centers and seaport terminals has brought about the extensive pipeline systems which carry the oil from the fields to these points.

A pipeline right of way and a line being built through a Louisiana swamp.

Pipeline Systems Are Extensive

From the Gulf of Mexico and the Rocky Mountains to the Great Lakes there extends a system of pipelines that makes it possible to transport crude oil from the most remote points to the seaports. Through swamps, across prairies and plains, under farms of cotton, alfalfa, wheat and corn, over mountains, beneath railroads and rivers, over irrigation ditches, under canals and through cities have been built these pipeline systems to carry the pulsating streams of crude oil from the distant oil fields to the refinery centers, where it is made into many products, or to seaports where it is loaded into tankers and transported to refineries at more distant points.

What a Pipeline System Is

Various pipeline companies have built different systems but in principle they are all the same. A pipeline system consists of trunk lines of connected steel pipe varying in diameter from 6 to 12 inches and extending over thousands of miles in a most direct course possible between the various terminals; it is the artery of the oil transportation system. Along the course of the pipeline there are located pumping stations about every 40 miles which relay the oil from station to station by powerful pumps until the terminal is reached. There are also the lateral lines which branch out from the trunk lines and connect the gathering systems of the individual fields. The trunk line may have terminals at refineries, seaports or tank farms. The deliveries to the refineries are usually run to the stills for immediate consumption, and the deliveries to terminals, located at seaports, are made to storage tanks or tankers, of 75,000 to 80,000 bbls. capacity, or the deliveries may be made to a tank farm for the purpose of storing the flush crude oil production from a new field. Feeding this trunk line system are the lateral lines which connect the gathering systems of the oil fields, and from the daily production of these fields, runs are made regularly to keep up the supply for the trunk line system, and when the consumption of petroleum products exceeds production, the storage oil in the tank farms is drawn upon to supply the additional requirements.

Material in a Pipeline

The tubes in a pipeline are made of open hearth steel with a tensile strength equal to 45,000 pounds per square inch. The tubes are lap welded. The sizes of line pipe which are known by their approximate internal diameters vary from 2 to 16 inches in the following sizes: 2, 3, 4, 6, 8, 10, 12 and 16 inches. The 16-inch line pipe is usually used for suction lines and low pressure work. The walls of the pipe vary from 0.15 to 0.5 inches in thickness, depending on the size and weight of the line pipe. The lines are either welded or screwed together in the field. In the case of a welded line, the pipe comes from the factory beveled to a certain angle for welding. In the case of a screwed line, each joint of pipe, about 20 feet long, received from the mill is threaded on both ends, American standard thread, and it is provided with an extra heavy coupling on one end and a thread protector on the other end. The coupling is screwed up on the pipe at the factory to make a tight fit. The thread protectors are screwed on only to protect the threads in transit. When the line is screwed together the threaded end of each joint of pipe is screwed into the extra heavy coupling of the preceding pipe to make a tight and leak-proof joint.

Double 8-inch lines of the Sinclair Pipe Line Co. winding their way through canyons, and over the escarpment of Teapot Dome.

Trunk Line Systems

Unlike the gathering systems, the trunk lines are more or less permanent and their construction is carried out with this in mind. The pipe is of large diameter and accordingly of large capacity; it is usually the case in trunk line systems to deliver from 20,000 to 150,000 bbls. a day to the various terminals. The pumping stations on the main line are built at considerable expense. Machinery is chosen for efficient and economical operation and the buildings are erected for permanence. On the other hand, the gathering system is somewhat temporary depending upon the life of the individual oil field to which it is laid. Many times a gathering system is laid and lateral lines have been run from the new field to the trunk line system, and within less than a year or two the whole gathering system has become obsolete. The construction of such a gathering system has entailed considerable expense, and many times an enormous loss ensues under these conditions. When a new oil field is discovered there is often a condition of peak production which declines rapidly, and unlike the old development methods of the Appalachian region the field is drilled quickly and the pipelines are required to provide facilities to take care of a peak production over a period of a few months. Large lines have been laid and large pumping units have been installed to care for the high initial production. As soon as the peak production is over the system must be altered to suit the new requirements; the large lines must be taken up and smaller lines must be laid; the large pumping units and stations must be dismantled and smaller equipment must be installed—in brief, the investment charge for the large installation must be taken care of by the revenue from the initial production or a considerable loss results. This is one of the risks which the pipeline company must take under the present day oil field development.

A main line pump station of the Sinclair Pipe Line Co.
1. Pumping Station
2. Auxiliary Room
3. Receiving Manifold
4. Discharge Manifold
5. Reservoir
6. Office
7. Heating Plant
8. Water Tower
9. Fuel Oil and Lubricating Oil Tanks.

Main Line Pumping Stations

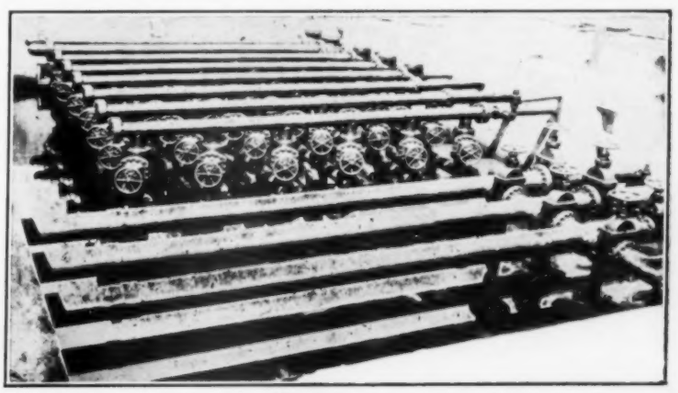
These pumping stations usually consist of a building to house the discharge pumps, the engines for driving the pumps and the auxiliary equipment; steel storage tanks having a capacity from 10,000 to 55,000 bbls. and manifolds where the incoming and outgoing streams of oil are switched to the various tanks, to the different pumping units, or into the different discharge lines leaving the station.

Station Buildings

Anticipating a rather long life for the main line stations, it is the policy of the pipeline companies to build permanent structures. Most of these stations are constructed of steel, concrete, tile and brick. The frame work is of steel with tile and brick walls and usually an asbestos corrugated roofing. The floors and conduits are of concrete and the firewall between the pump room and the engine room is constructed of tile or brick. This practice of using a fire wall between the two rooms in the pumping station is the result of some very disastrous fires due to the escape of oil and inflammable vapors from the discharge pumps into the Diesel engine room, where the vapors were ignited or an explosion occurred due to the vapors being taken into the air inlet of the engine.

Pumping Station Manifolds

The manifold consists primarily of ex-



A pipeline manifold without the building erected.

SEAMLESS STEEL LINE PIPE

Sizes up to 5 in.

EXTRA LONG LENGTHS
PROMPT DELIVERIES

Seamless Steel Line Pipe is characterized by great strength, uniformity and long life. The long lengths available decrease the number of joints in a line and thus reduce laying costs.

THE BABCOCK & WILCOX TUBE CO.

Works, Beaver Falls, Pa.

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85 Liberty St., New York, N. Y.

Branch Sales Offices:

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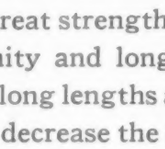
Marquette Building

DENVER
444 Seventeenth St.

NEW ORLEANS
344 Camp St.



HOUSTON
1011 Electric Bldg.

DALLAS
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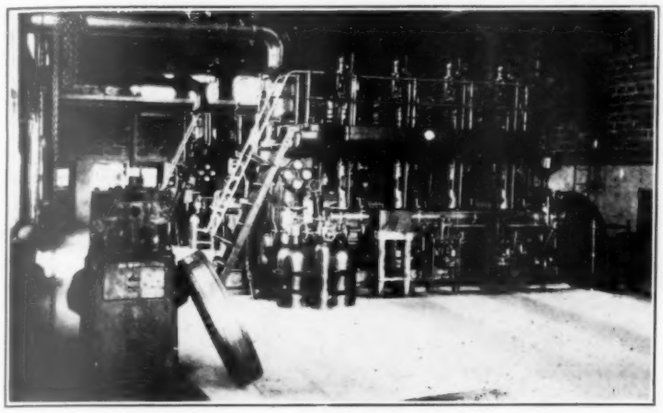

A 4-cycle, 4-cylinder, 440-horse power Diesel engine in pipeline service.

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At some pumping stations there will be more than one manifold, on account of the complexity and size that would be encountered in one manifold. At some stations there will be a discharge manifold, where the outgoing streams from the discharge pumps are switched into the various discharge lines from the station; a receiving manifold where the incoming streams from another station or from gathering lines are directed into different pumping units or into tankage a tank manifold where the various streams of oil can be switched to or from the various tanks on the tank farms.

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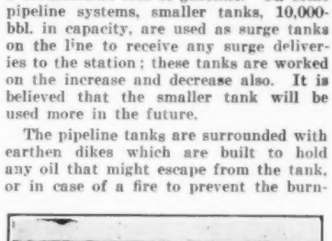
Tankage

The practice in the past has been to use two 55,000-bbl. steel tanks for storing and receiving the oil from the field or for holding the additional amount of oil that is being received at a greater rate from another station than is being delivered away from the station. It used to be the practice also to fill one of these 55,000-bbl. tanks with the incoming stream of oil, while the other tank was being emptied by the discharge pumps. Where the oil is being received from the field it must be run into a tank in order that it can be gauged to check any shortage or loss from the field; but where the oil is being relayed from station to station in the trunk line system, the present practice is to work these tanks on an "increase and decrease;" that is only the surplus oil over the pumping rate of each station goes into the tank. At some stations the 55,000-bbl. tanks are used as surge tanks on the incoming stream of oil and only the excess amount of oil that is not being handled out of the pumping station goes to the tank. This practice saves a considerable amount of evaporation over the old method when the tank was alternately filled and emptied; each time the tank was emptied air was drawn into the tank to become saturated with the light hydrocarbon vapors and when the tank was filled again the whole gas volume in the tank was expelled to the atmosphere to be lost. This practice caused a considerable loss of gasoline. On some pipeline systems, smaller tanks, 10,000-bbl. in capacity, are used as surge tanks on the line to receive any surge deliveries to the station; these tanks are worked on the increase and decrease also. It is believed that the smaller tank will be used more in the future.

The pipeline tanks are surrounded with earthen dikes which are built to hold any oil that might escape from the tank, or in case of a fire to prevent the burning oil from spreading to the surrounding property. The tanks are located at good distances from the pumping stations and the tanks themselves are spaced at least 500 feet apart; this is done to reduce the fire hazard. The tank dikes are graded and provided with drain lines so that the dikes can be kept free of water at all times; this is for the purpose of keeping the tank foundation dry and to prevent the boiling over of the oil in the fire dike in case of a tank fire.



A 55,000-bbl. pipeline working tank.

Vent lines are provided for each tank to carry off the gas and to permit the influx of air when the tank is being emptied. The vent lines, made of pipe varying from 6 to 10 inches in diameter, are usually connected to some point on the roof and laid to a point just outside of the fire wall where the gases are exhausted to the atmosphere. Each vent line is provided with a single or a multiple set of gauzes to prevent the flashback of a flame to the tank in case the exhaust from the vent should be ignited.

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Two 10,000-bbl. tanks used as surge tanks at a pumping station.

Motive Power

The motive power for the early pumping stations in pipeline service consisted of steam engines, but more recently the Diesel engine has been used. In fact where new pump stations are built Diesel engine equipment is used exclusively, except where heavy oil is being transported and the exhaust steam is used for heating the oil. The Diesel engines vary in size from 200 to 750-horsepower. The earlier installations of Diesel engines made use of the 4-cycle 2-cylinder horizontal, and the 4-cycle, 4-cylinder vertical engines in sizes up to 250 horse power. The recent installations have all been of the vertical type varying from three to six cylinders with a horse power rating up to 750 horse power; both the 2-cycle and the 4-cycle engines are being used. This type of motive power has proved to be the most economical and convenient. The fuel supply has usually been taken from the crude oil stream passing through the station, but with the advance in the price of crude, many of these stations are being supplied with fuel oil from the refinery, which is shipped to the pumping stations in tank cars. The Diesel engines are guaranteed to develop a brake horse power hour on 0.45 pounds of fuel oil when the engine is operated at full load, and when the engines are run at this rating, they will approximate this efficiency. However, it is often the case that the engine cannot be operated at the maximum load, and the efficiency is not quite this figure; in fact it is the policy of the pipeline companies to operate the Diesel engines at about 85 per cent of their rating, because it has been found that the maintenance and repairs on the engines can be kept at a low figure by operating them at this rate, whereas the full load operation means a high maintenance and repair charge. An effective thermal efficiency of 30 per cent at one-half load to 37 per cent at full load is realized in the use of the Diesel engine. The engines are connected directly through a flexible coupling to the discharge pumps, which are geared at a ratio of 1 to 5 or 1 to 6 so that the R. P. M. on the pumps are about 30 to 40.

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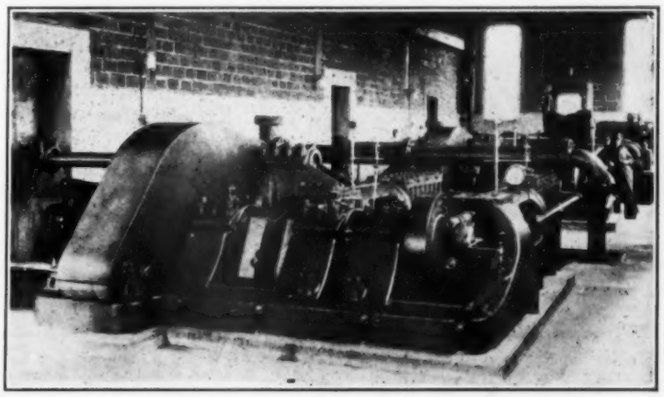

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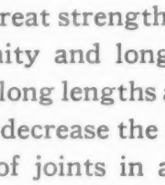

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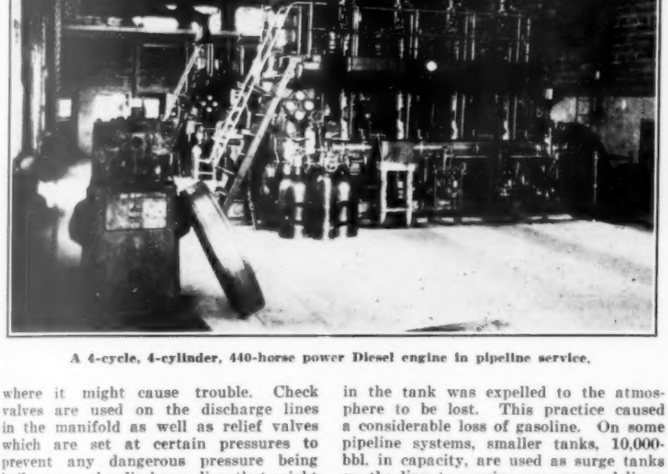

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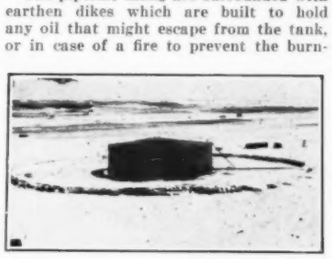

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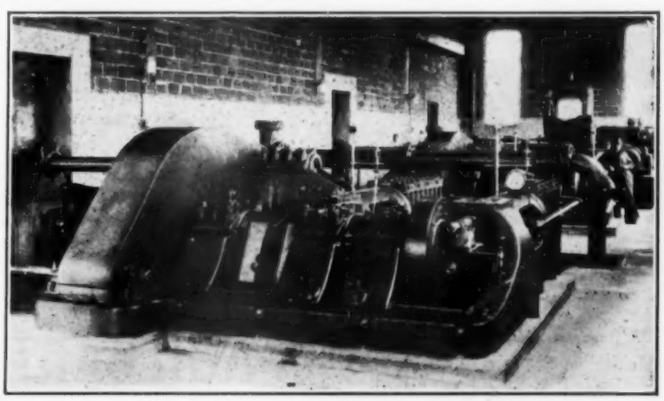

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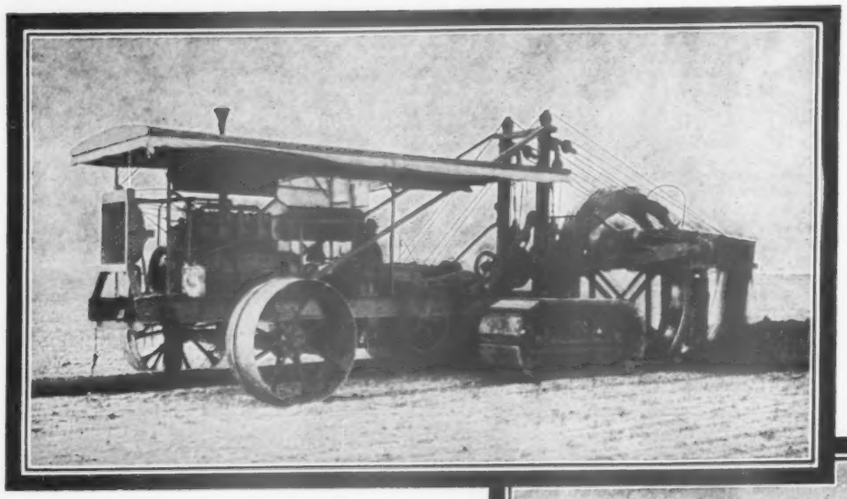

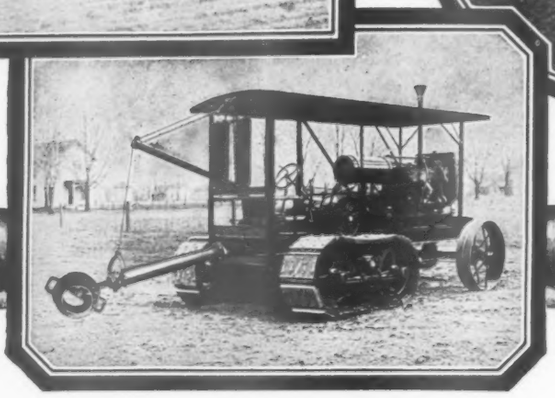

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Little wonder, then, that the industry in general believes, in the words of one owner, "*the Buckeye is the only ditcher that will meet all requirements in an oil field*".

The Buckeye Pipe-Screwing Machine connects pipe in a hurry. It is the only unit of its kind that is equipped with wheels for road traction and that can move from one job to another under its own power.

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Buckeye BUILDERS OF TRENCH EXCAVATORS

If you build pipe-lines, this book is worth reading. Copy sent free upon request.

REMARKABLE performance records are contained in this booklet. Every one is authentic, because they are based on actual experience right in the field. It gives facts, figures and pictures. It tells of Buckeye equipment in Montana making a record of 72 miles in 30 days — over rough and broken ground. One of the country's foremost pipe-line construction companies tells how their Buckeye in two weeks cuts 30,300 feet of ditch, 6 feet deep. Thirty per cent of the work was in hard shale, in extremely cold weather with plenty of snow. ¶Many other equally interesting and accurate records are given. Send for your copy of this booklet—*use the coupon.*

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Manufacturers of

Pipe-Line Trench Excavators and Pipe-Screwing Machines

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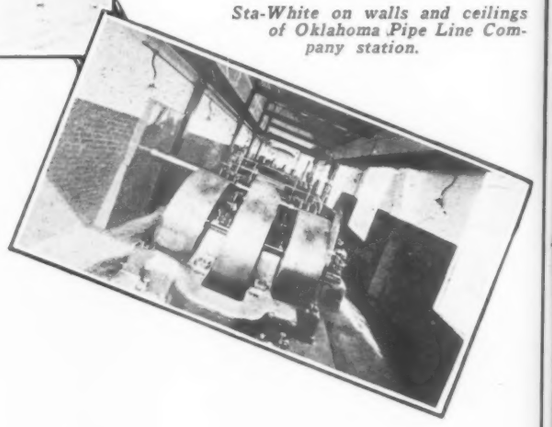
Sta-White on walls and ceilings of Prairie Pipe Line Company station.

Sta-White on walls and ceilings of Oklahoma Pipe Line Company station.



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California Has Big Pipeline System

Network of Pipe Extends from Los Angeles Basin to Refineries Near San Francisco. Load Vessels at Sea

By L. P. Stockman

California has one of the most comprehensive system of pipelines in the world, extending from San Francisco in the north central part of the state to Los Angeles Harbor in the south, a distance of approximately 500 miles. The various tanker fleets of the major companies operating throughout the state supplement pipeline operation by tanker movements in both directions, and this is a very important factor in view of the fact that none of the larger companies has direct pipeline facilities extending the entire distance from San Francisco to Los Angeles.

Oil could, however, if necessary, be moved by pipeline from Los Angeles to San Francisco or vice versa by utilizing either the Standard or Associated's line to Kern River and making connections with either the General Petroleum or Pan American's system running from Midway-Sunset in the San Joaquin Valley to Los Angeles Harbor in the south. The Shell's line from Martinez to Coalinga might also be utilized by tying up with the Union, Associated, Standard and General Petroleum and Pan American. The policy of the various companies, however, has been to use their own facilities and effect interchange of oil at points not served. For instance, the Standard has a surplus of crude in southern California, while the Associated has a surplus in the north. Instead of the former moving crude north and the latter transporting its oil south they have eliminated this duplication of effort by effecting an interchange. The Standard delivers southern California crude to the Associated at Los Angeles while the latter offsets this with San Joaquin Valley oil. Similar transactions are also made by the other major companies, the object being to reduce unnecessary movements of crude or fuel oil.

Divided Geographically

California is geographically divided by the Tehachapi Mountains and peculiarly the pipeline systems north of this range are far less complicated than those south of this given separatrix, due to the fact that there is a smaller number of pipeline companies serving this region and also because the fields are not located in as small an area. The Standard, Associated and Shell lines, extending from Bakersfield to San Francisco Bay, present a simplified system, although of course each trunk line varies in construction due to the method of operation peculiar to each company. Those in southern California, on the other hand, due to the proximity of the various fields in that section of the state, are much more complicated, several pipelines in many cases overlapping and running side by side. In one or two instances at Long Beach relocation work was delayed several hours because of difficulty in identifying lines. In addition to those running north and south in the state, there are several lines extending westward to the coast from inland points. The Associated has connections from Coalinga to Monterey, while the Union has an outlet at Port Hartford on San Luis Obispo Bay for oil produced in the various fields of Fresno and Kern Counties.

Standard's System

In order to cover thoroughly the network of pipelines in California, it might not be amiss to trace each individual line from beginning to end and noting the location of the various terminals, tank farms and refineries without going into any great detail. The Standard has, perhaps, the most comprehensive system of lines and, although the company has no connections southward over the Tehachapi range, it is, nevertheless, refining southern California oil at its Richmond refinery near San Francisco due to its ability to move this petroleum by utilizing its fleet of tankers. The company's principal system extends from its Richmond refinery southward to Bakersfield, a distance of about 285 miles. This trunk line is fed by branch lines connecting all the fields in Kern County, while another gathering system connects the Coalinga Field in Fresno County with the trunk line at Mendota.

The Associated's pipeline differs somewhat from the Standard's system in that the former has two trunks running southward from Port Costa which diverge at Arbios, a little north of Fresno, one extending down to Kern River and the other to Taft. The "K" line affords the company an outlet for oil produced at Kern River, while the "C" line, that passing through Coalinga and extending down through Lost Hills, Belridge, McKittrick, Midway-Sunset and Elk Hills, takes care of the production in these fields. The company's so-called Coalinga-Monterey line originates at Coalinga and has its terminus at Monterey, 106 miles away. The company enlarged its facilities at Monterey late in 1925, by installing additional storage facilities and the laying of two submarine lines, a 12-inch for heavy crude and an 8¼-inch for light oil. These two submarine lines, both of which are welded, can handle 6,000 bbls. of light crude an hour by using two 12-inch rotary pumps or 3,000 bbls. an hour by gravity flow. The company's storage tanks at this point are located on a ridge at a considerable elevation and the oil can thus be gravitated from the shore to tankers if desirable.

Submarine Line at Ventura

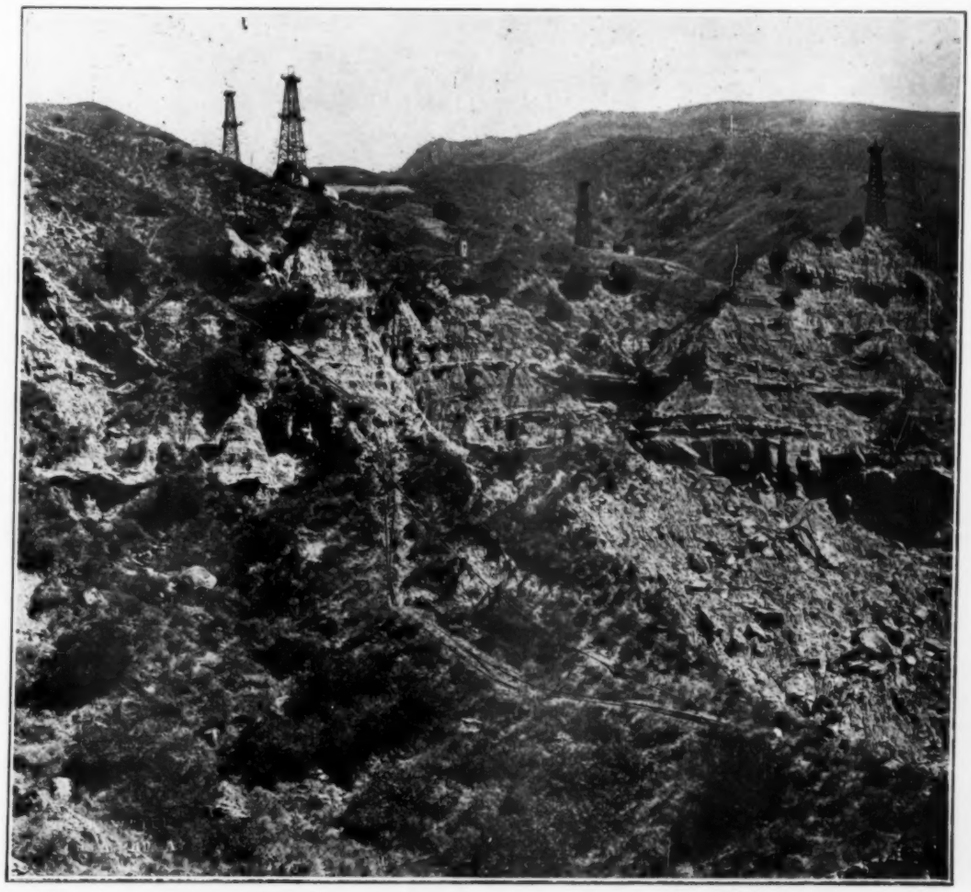
The Associated has another sumarine pipeline at Ventura, both of these harbors being outside ports and not affording adequate docking facilities. Previous to the development of large production in the Ventura Avenue Field, the company anchored its tankers about 800 feet off the end of the old wharf and ran on an 8-inch rubber hose. The stringing of this hose every time a tanker came in always caused considerable loss of time and, as a whole, the practice was slow and unsatisfactory. The company's engineering staff undertook the job of laying a submarine line and came through with flying colors.

A total of 3,200 feet of 10-inch, 45-pound Youngstown casing was screwed together and welded at the collars in four 800-foot lengths and laid parallel on the beach pointing seaward. These sections were then tested under 500 pounds pressure and later painted with oronite and coated with Biturine enamel. The next move was to build a track of 6 by 6 pine timbers and several small sleds to run on the tracks. After completion, the first 800-foot length of pipe was then rolled over upon these sleds and made ready. The sea end was then plugged and a sand sled attached to the head of the line with a buoy attached so that the position at the end of the line could be determined at all times. It only took the tug five minutes to tow the first 800 feet to sea but unavoidably the land end was pulled into the surf requiring the aid of a tractor to pull it back.

The second 800 feet was then welded and a river clump bolted on to strengthen the joint. Each 800 feet of pipe used, of course, added to the weight and friction and, while some difficulty was experienced in pulling out the last length, it was accomplished satisfactorily. When the final signal was given to the tug to drop anochor the sea end had been pulled out 2,850 feet from shore and rested in 35 feet of water. A diver then removed the plug and, after attaching a flexible armored hose a little over 100 feet in length, made it fast to a buoy. Several tons of chain were used as a weight in order to keep the line in place. A similar method was used in laying the two submarine lines at Monterey and all are working very satisfactorily.

Shell's Pipeline

The Shell's pipeline extends northward through the San Joaquin Valley from Coalinga in Fresno County to its Martinez refinery at Martinez on San Pablo Bay, but a short distance from Oakland and San Francisco. This company's principal source of supply in northern California is at Coalinga in Fresno County and the relatively small production



Pipelining on South Mountain, Ventura County, Calif., has its ups and downs

which it has in Kern County does not warrant the extension of this Coalinga line at the present time. Completion of the company's No. 1 Vedder, which was instrumental in opening up the Mt. Poso Field some 15 miles outside of Bakersfield and incidentally assures the company of good production in Kern County, might, however, result in an eventual extension of the line which now has its terminus at Coalinga. Although this is only a possibility at the present time and is dependent to some extent on the potentiality of the Mt. Poso district, it seems logical to assume that the company will find it advantageous to extend its facilities southward to Kern River some day, for in this way it will not only be in a position to handle its own production but can make a bid for crude in the open market if desirable. Then, too, new fields will undoubtedly be discovered in Kern and other San Joaquin Counties, and, with adequate facilities available, the company will be in a position to take advantage of any eventuality.

It is the general consensus of opinion that much of California's future production must come from that vast undeveloped section of the state north of the Tehachapi range and for this reason it is highly probable that steps may be taken within the next year to extend existing facilities, particularly in view of the fact that the Shell recently paid Miller & Lux $1,000,000 for the exclusive privilege of drilling some 30,000 acres of potential oil land. This deal undoubtedly gives the Shell permission to lay pipelines, in which event part of the right of way has already been secured.

Union Oil Co. Lines

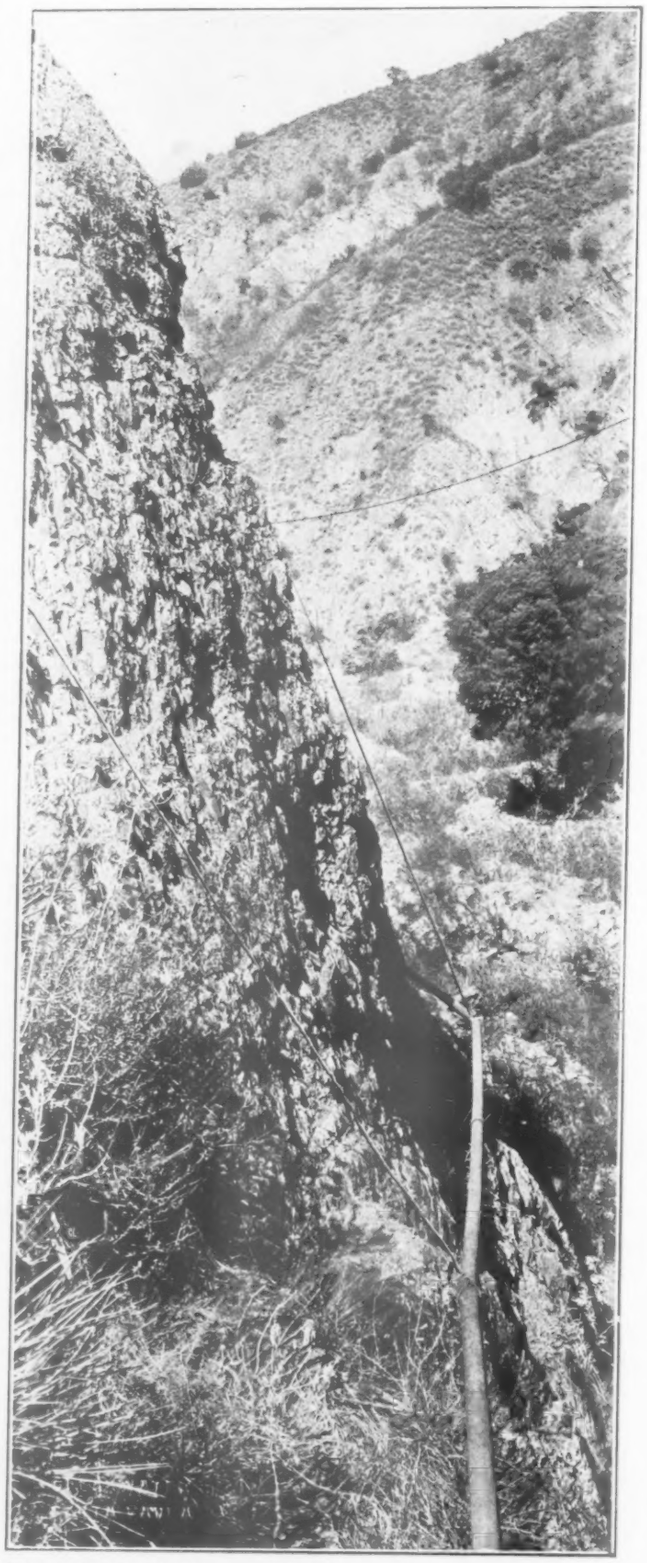
The Union Oil Co.'s San Joaquin Valley system is practically an 8-inch for its entire length. From Port San Luis there are two 8-inch lines running up through San Luis Obispo, Santa Margarita, Creston, Shandon and Antelope to Junction, at which point an 8-inch line leaves the system northward passing through Dudley and Tar Canyon and on up to the Coalinga Field, a distance of approximately 41 miles. The two main trunk lines continue in a southeasterly direction from the company's Junction pump station, at which point the Coalinga line enters the system. The two main trunks which extend from Junction to Midway take care of the company's production and purchases in the Lost Hills, Belridge, McKittrick, Elk Hills and Midway Fields. To handle oil run from the Maricopa or Sunset section of the Midway-Sunset Field, the company has one line connecting with the two main trunks at Midway. The Kern River Field, which lies approximately 40 miles east and a little north of McKittrick, is taken care of by a single 8-inch line passing through Buttonwillow, Rio Bravo and Rosedale, there being pump stations at these points.

In addition to this San Joaquin Valley system, designated as the Producers Pipe Line, the Union has another important trunk, the Lompoc pipeline, which handles production and purchases in the Santa Maria Fields of Santa Barbara County. This line, which is also an 8-inch and has a capacity of approximately 15,000 bbls. a day, runs southeastward from Avila on the coast and passes through Summitt, Orcutt and Bell, three pump stations along the route. The Union's Ventura pipeline, which takes care of production in Ventura County, traverses the productive Santa Clara Valley and runs from Ventura to Santa Paula, from which point gathering lines run up through Ojai, Sespe, Fillmore and Bardsdale. The Ventura pipeline, the first oil carrying pipeline system in the State of California and probably the first laid west of the Rockies, is one of the most unusual in the state in that it does not require pump stations, the oil being gravitated from the various producing groups southwesterly to Ventura.

Construction work on this line was initiated in 1884 but, due to the mountainous country, it was some time later before the system was finally completed. In many cases the line is literally hung along the canyon walls and suspended on cables across numerous ravines. The main trunk, which is made up of 2, 3 and 4-inch pipe, represents a considerable amount of engineering work but it is probably one of the cheapest operated lines in the state. Its terminus is at Santa Paula, where the Union has a small refinery. Part of the original line laid in 1884, and which is still in active use, was brought around the Horn to Los Angeles and Ventura, from which points it was transported by railroad and trucks to its present location.

Pan American's System

The Pan American has the latest and perhaps the most modern pipeline system in the State, the main trunk extending from the Elk Hills Field in the San Joaquin Valley to Los Angeles Harbor and Watson tank farm and refinery, a distance of approximately 125 miles.



Union Oil Co.'s pipeline suspended from walls of a canyon, Ventura County, California.

It is the largest line laid over the Ridge Route and, in addition to being the longest welded line in the State, is the only system in California entirely equipped with Diesel engine power. It parallels the oil line of the General Petroleum and the gas line of the Midway Gas Co. for a large part of the distance covered, although the routes diverge at several points.

In building its line, the Pan American chose a route which differs in several important respects from that followed by the other two lines just mentioned. The General Petroleum and Midway Gas Co. lines are routed around Wheeler Ridge, while the Pan American system is routed over it. Through this mountainous section the line literally runs up and down hill in practically a straight line, regardless of the contour of the country. The company's engineers decided at the very outset to lay as large a line as possible in order to reduce friction, in as much as this is a very important factor in oil transportation in that the greater the friction in proportion to the amount of oil handled the more power required. The General Petroleum line from the San Joaquin Valley to Los Angeles is an 8-inch line served by seven pump stations located at advantageous points along the route while the Pan American line is larger in diameter and requires but five pumping plants.

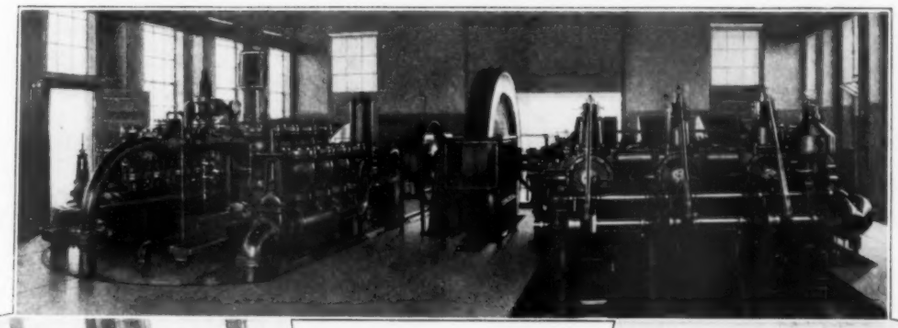
Used 10-Inch Pipe

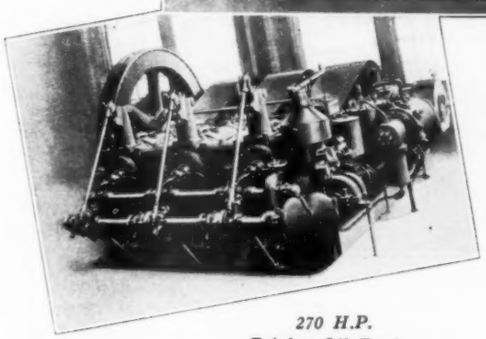
The Pan American, handling a slightly lighter gravity oil with consequent less friction, decided to use a 10-inch pipe, eliminate the usual heating units and install adequate Diesel engines supplemented by emergency electrical power. The increased cost of this larger pipe is offset by a lower operating cost and the fact that its use allowed a reduction in the number of pump stations required because of the smaller friction in the line. The company's first pump station is its Lake plant at Taft, which delivers the oil over a comparatively flat country to the foot of Wheeler Ridge, where another pump station boosts the oil to the crest, from which point there is a gravity flow to Grapevine at the foot of the ridge. The Grapevine pump station shoves the oil through to Tejon, where the fourth station boosts it over the top of the Ridge Route and across Liebre Canyon to the fifth and last station at Newhall, which pumps it the remainder of the distance to Wilmington. The line has a capacity of 30,000 bbls. daily and it requires about three days to pump a barrel of oil from Taft to Watson refinery near Los Angeles Harbor.

Each pumping plant is equipped with two 300-horsepower Diesel engines and two pumps with a capacity of about 30,000 bbls. a day. In addition to this equipment, the plant has auxiliary electrical equipment including generators for use in any emergency. Adequate housing facilities are provided at each of the five plants for a normal crew, which consists of seven men, three shifts of two pumpers each and an engineer. The Pan American's line has just finished its first full year's service, during which time it has caused no trouble whatever. In the event that future operations indicate the necessity for a greater capacity this situation can be met by adding additional power and pumping units at each station.

The pumping plants are constructed of reinforced concrete but allowance has been made so that they can be enlarged at a minimum expense. Instead of building the four walls of reinforced concrete, one end has been finished with a sheet iron which can be torn out quickly in the event that additional equipment is needed in the future. The oil being run at the present time is of comparatively light gravity but in the event that any heavy oil production is secured, adequate heating units can be installed within a short time. The completed line, which was constructed by the Petroleum Securities but recently turned over to the Pan American, is buried from 4 to 6 feet, depending upon the country traversed. The average through the Tehachapi Mountains, which are snow covered during a part of the winter months, is around 5 feet. The total cost of this

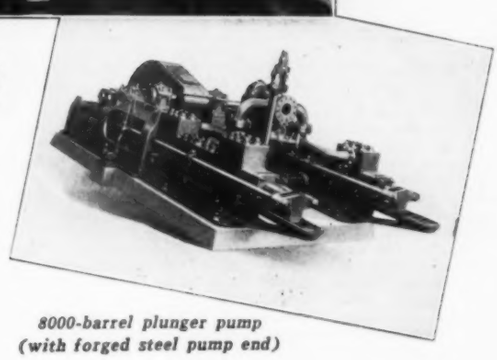
PIPE LINE OIL PUMPING UNITS





270 H.P. Triplex Oil Engine

14000-barrel Allis-Chalmers plunger pump (pot type) connected to Allis-Chalmers triplex oil engine.



8000-barrel plunger pump (with forged steel pump end)

"A Satisfied Customer is the Best Advertisement"

One customer has purchased fifty-six [56] of these pumping units during the past ten [10] years.

Designed and constructed to insure Dependability and Continuous Operation

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OIL ENGINE DRIVEN OIL LINE PUMPS—MOTOR DRIVEN PLUNGER PUMPS
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ALLIS-CHALMERS
MILWAUKEE, WISCONSIN

line, which is under the supervision of J. C. Burnett, was somewhere in the neighborhood of $4,000,000.

Congestion at Los Angeles

Due to the proximity of producing fields in southern California to Los Angeles Harbor, this area presents the most congested section of the State. Practically every major operator in California has one or more lines connecting the various fields with refineries and marine docks at Wilmington, from which point crude and refined oils are shipped to all points of the world. It is rather difficult to trace the route of each individual line in southern California. The Standard and Union have, perhaps, the most comprehensive systems, covering as they do practically every field in this particular area. Due to the location of the various producing fields, the numerous main trunk lines look more like feeders or gathering lines in some large district. The Union system, for instance, consists of two lines southward from Norwalk to its Los Angeles refinery at Wilmington, which parallel one another for some distance. The company's lines in this section of the State vary in diameter from 6 to 8 and 10 inches, depending upon the fields served and the quality of oil handled. The ship loading line extending from the refinery to the marine dock at Wilmington, a distance of about 2 miles, is a 10-inch.

The Standard's lines are also 6, 8 and 10 inches in diameter, although there is one 12-inch extending from the El Segundo refinery to Wilmington. The company has an 8-inch and a 6-inch from Inglewood to El Segundo and combinations of 6, 8 and 12-inch lines from this point to Wilmington. Lines of similar dimension also feed westward to El Segundo and southward to Wilmington from Northam and Newmark, the production of the various fields being picked up en route. The Company has two 8-inch trunk lines from Huntington Beach which enter the main system at Northam, from which point of course the oil is pumped to either El Segundo or Wilmington, depending upon the disposition to be made of it. Very few operators are familiar with the fact that the Standard has a combination 2-inch and 3-inch lines extending from Newhall to Ventura on the coast and, although it is not in use at the present time, it is in good shape and capable of handling oil if conditions warranted.

The "tongs gang" at work on Standard Oil Co. of California line at Elk Hills, Calif.

Location of Refineries

The location of the various refineries and tank farms and methods of handling oil are, perhaps, the most interesting features in connection with a summary of pipeline work and, while it is impossible to go into any great detail, it might not be amiss to call attention to the most important methods of operation peculiar to each company. The Standard, the largest producer and marketer on the West Coast, has three refineries, one at El Segundo in southern California, another at Bakersfield in the San Joaquin Valley and a third at Richmond just outside of Oakland. As a rule this company does not store oil in its crude state but has adopted the policy of either topping or refining it as soon as practicable and storing in the form of tops, gasoline, kerosene, fuel oil, etc. The company's tank farms are generally located in close proximity to the three refineries, although of course considerable storage facilities are maintained at other points throughout the State.

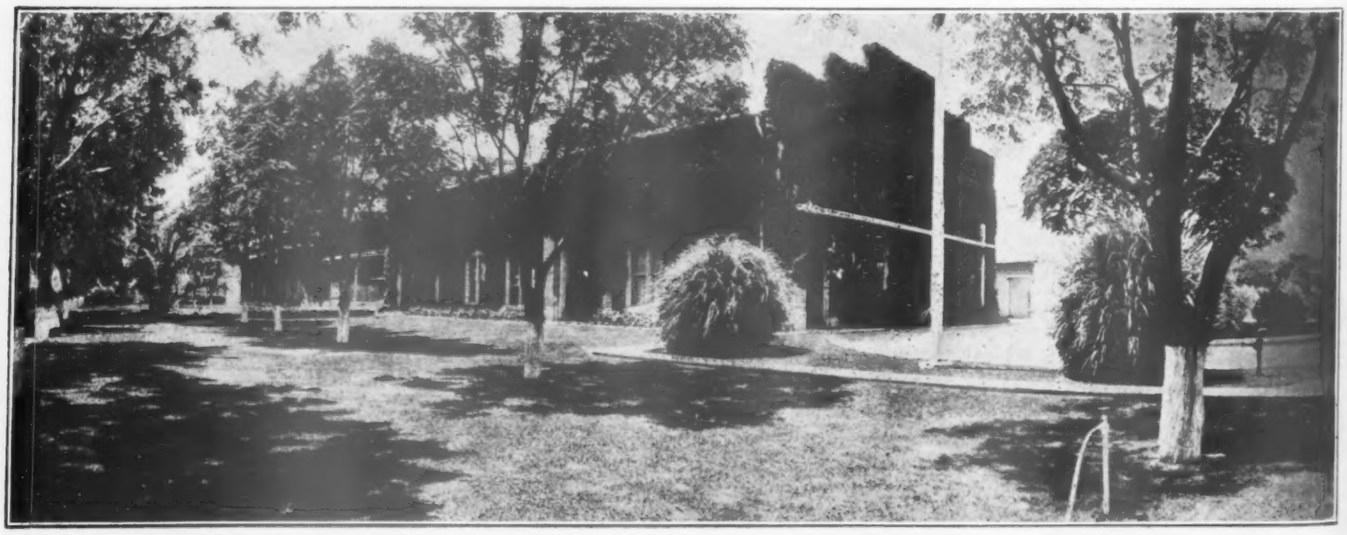
The Standard's principal concentration points are at El Segundo, Coyote, Kern River, Midway, Pond, Los Mendanos and San Pablo, although each pumping station has one or more storage tanks in addition to the necessary working space. The Standard is running more pipeline oil in southern California than its El Segundo refinery requires and as a result a considerable part is being interchanged or moved northward by tankers to its Richmond refinery. The company's tanker fleet played a very important part in the successful handling of the overproduction situation in 1923 and 1924, as no inconsiderable amount of oil was moved from Los Angeles Harbor to Richmond, thus alleviating the storage situation in southern California. The company has 48 reservoirs just outside of Bakersfield, many of which were empty at that time but, by topping the oil moved from Los Angeles to Richmond, the pipeline department was able to utilize this available storage by reversing the usual operation of pumping from Kern to Richmond.

Pan American pipeline from Taft, Calif., to Los Angeles, crossing some low land. Note the welded pipe uprights.

Union's Refineries

The Union Oil Co. has refineries at Wilmington, Kern River, Oleum, Santa Paula, Avila and Vancouver and has started reconstructing the plant at Brea destroyed by fire when three reservoirs boiled over after being ignited by a bolt of lightning last April. The company has also started reconstructing the tanks and equipment destroyed at Brea and San Luis Obispo and will undoubtedly start to replace the oil lost as soon as the necessary tankage is available. The refineries at Oleum and Vancouver are running on crude produced both in southern California and in the San Joaquin Valley, the company's tanker fleet playing a very important part in transporting oil from Wilmington and Santa Maria to these points. The Union's refineries have a normal running capacity of 80,000 bbls. of crude daily, which will be further increased by the rebuilding of the Brea refinery and enlargement of existing facilities at Bakersfield. Each of these plants will increase the Union's refinery capacity 5,000 bbls. a day.

The Oleum refinery, near San Francisco, which handles 25,000 bbls. of crude daily, produces refined oils, all the company's lubricants and greases, and most of the asphalts. The Edeleanu plant at Oleum, utilized principally for the treatment of kerosene by the Edeleanu sulphur dioxide process, is practically completed; it will enable the company to produce economically a domestic kerosene of superior quality. The bulk of Union gasoline is produced at the Los Angeles refinery, located at Wilmington, which has a running capacity of 50,000 bbls. of oil daily. The company is now operating its new, high pressure cracking installation at this plant. The installation has a daily throughput capacity, while on stream, of 10,000 bbls., equivalent, for gasoline production, to about the same quantity of crude per day. Research engineers recommend this type of cracking process after a series of investigations and observations made during the past five years. The operation thereof is



Honesty compels us to admit all California pump stations are not as enticing as the Emerald Pump Station of the Standard Oil Co. of California, shown above. There are many, however, that "out-shine" municipal parks.

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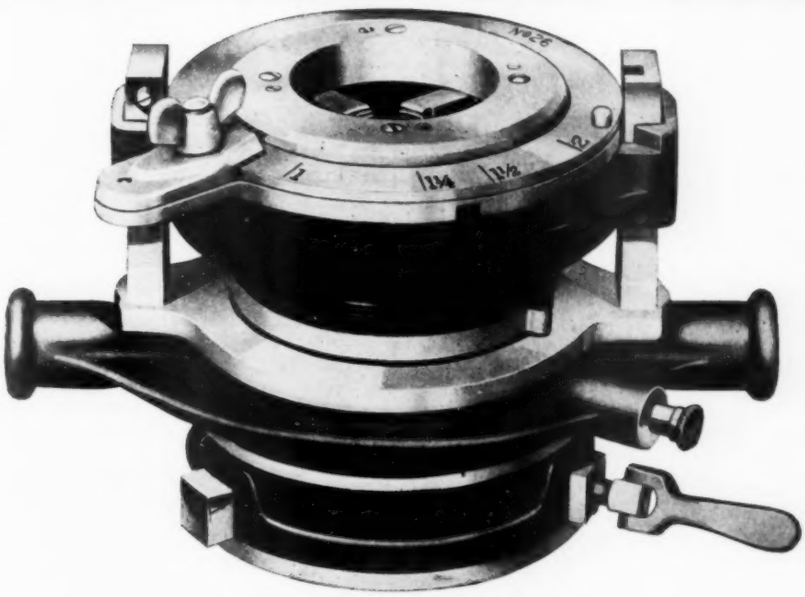
No. 26 Beaver
Ratchet
1, 1¼, 1½ & 2



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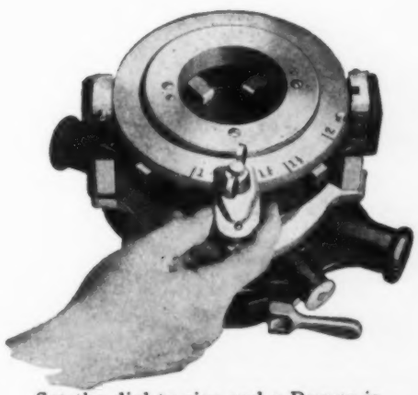

Set the dial to size and a Beaver is ready—a simple operation that takes but a few seconds. Hunting for dies and bushings may take 5 minutes or it may take half an hour —or even longer.

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under the Cross and Black cracking patents licensed by Gasoline Products Co., combined with licenses under the cracking patents of Standard Oil Co. of Indiana, Standard Oil Co. of New Jersey and The Texas Company.

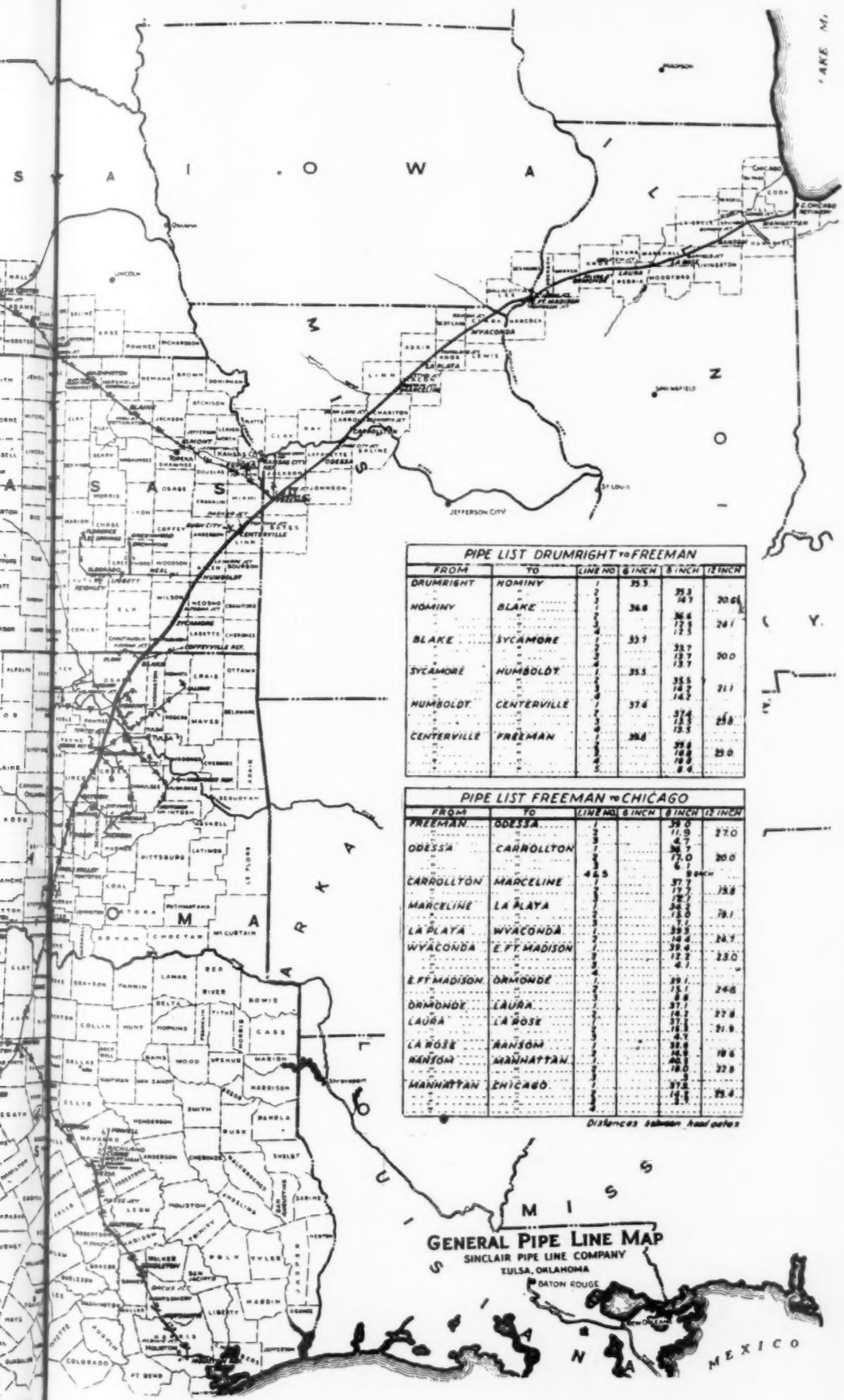
Shell's Refineries

The Shell has two refineries in California, one at Watson, near Los Angeles Harbor, with a capacity of 35,000 bbls. daily, and the other at Martinez on Suisun Bay, 31 miles outside of Oakland, which is rated at 33,000 bbls. daily. Both are complete units and are supplemented with Dubbs cracking installations. The former is running on southern California crude while the latter is operating on oil produced in both the San Joaquin Valley and in fields located in the southern part of the State. In addition to these two plants, the company has a topping plant in operation at Coalinga in Fresno County. The Shell's principal storage points are at Watson, Martinez and Coalinga, all three points being pipeline terminals. The Associated reports refineries at Watson in southern California and at Avon and Martinez in the northern part of the State, in addition to a 1,500-bbl. topping plant at Taft in the San Joaquin Valley. The Martinez and Avon refineries are operating on production originating principally at Ventura and in the fields of the San Joaquin Valley, while the refinery at Wilmington, which is really a topping plant, is running on southern California crude. The Associated's main storage is at Watson, Avon and Kern River, pipelines connecting these points with the refineries operated.

The Pan American has perhaps the most modern refinery in the State, located at Watson near Los Angeles Harbor, at which point is also situated the company's principal tank farm. This refinery is operating on crude produced in both southern California and in the San Joaquin Valley, the oil from the latter point being moved to Watson via its 10-inch welded line extending from Taft to Los Angeles, passing over the Tehachapi Mountains en route. The General Petroleum's refinery is at Vernon near Los Angeles, although the company has skimming plants at Lebec, Maricopa and Olinda. The company's Vernon plant is operating on both crude produced in southern California and the San Joaquin Valley. Oil from the latter area is transported to Los Angeles through the company's pipeline system extending from Lost Hills to Vernon and thence to Wilmington.

The California Petroleum and subsidiary companies have refineries at Fillmore in Ventura County, Watson in southern California, and Seattle, Wash. Several topping plants located at Coalinga, Taft, San Francisco and Santa Fe Springs are also operated by the company. This concern's principal storage is at Watson, near Los Angeles Harbor, this concentration point being connected with the various producing fields in southern California. The Richfield and Julian Petroleum have pipeline connections with the major fields in southern California and ample harbor loading facilities at Los Angeles Harbor. The Richfield's refinery, which is supplemented with Cross cracking units, is located at Rioco just outside of Long Beach, this plant being operated in conjunction with a skimming and asphalt plant at Bakersfield in Kern County.

In closing this short and rather incompleted pipeline resume, the writer wishes to express his sincerest thanks for the wonderful co-operation of the various pipeline superintendents, and others too numerous to mention. With all due respect to the other major industries of the United States, I am of the opinion that the petroleum industry has a much superior personnel than any other calling and a more hearty welcome. The pipeline boys in California, of whom there are no better, are a real bunch of he-men who look you straight in the eye and shoot just as clean.


PIPE LIST DRUMRIGHT to FREEMAN
FROM | TO | LINE NO | 6 INCH | 8 INCH | 12 INCH
DRUMRIGHT | HOMINY | 1 | 35.5 | 35.2 | 30.6
HOMINY | BLAKE | 1 | 36.6 | 36.6 | 24.1
BLAKE | SYCAMORE | 1 | 33.7 | 33.7 | 30.0
SYCAMORE | HUMBOLDT | 1 | 35.5 | 35.5 | 21.1
HUMBOLDT | CENTERVILLE | 1 | 37.4 | 37.4 | 25.8
CENTERVILLE | FREEMAN | 1 | 36.6 | 35.6 | 25.0
PIPE LIST FREEMAN to CHICAGO
FROM | TO | LINE NO | 6 INCH | 8 INCH | 12 INCH
FREEMAN | ODESSA | 1 | 35.0 | 27.0
ODESSA | CARROLLTON | 1 | 36.7 | 30.0
CARROLLTON | MARCELINE | 1 | 37.1 | 23.8
MARCELINE | LA PLAYA | 1 | 33.0 | 28.1
LA PLAYA | WYACONDA | 1 | 35.5 | 24.7
WYACONDA | E. FT. MADISON | 1 | 39.4 | 23.0
E. FT. MADISON | ORMONDE | 1 | 39.1 | 24.8
ORMONDE | LAURA | 1 | 37.1 | 27.6
LAURA | LA ROSE | 1 | 37.1 | 21.9
LA ROSE | RANSOM | 1 | 38.8 | 19.6
RANSOM | MANHATTAN | 1 | 40.1 | 32.9
MANHATTAN | CHICAGO | 1 | 37.4 | 25.4
Distances between head gates
GENERAL PIPE LINE MAP
SINCLAIR PIPE LINE COMPANY
TULSA, OKLAHOMA
BATON ROUGE
IOWA
MISSOURI
KANSAS
OKLAHOMA
MISSISSIPPI
LOUISIANA
MEXICO

Pipeline Companies Use Much Equipment In Their Operations

A list of principal articles of equipment used in the pipeline branch of the petroleum industry follows:

For Pipeline Construction

Ditching machines, picks and shovels, blasting powder, tractors for backfilling, pipe-laying machines, pipe-laying tongs, line pipe, fittings and valves. Under fittings comes "ells," flanges, unions, "45 ells," nipples, plugs and "T's." This type of supplies are generally purchased in large quantities; for instance, a large oil company recently closed a deal for $200,000 worth of valves for pipeline and field use. Stocks, dies, cutting and threading machines, motor trucks and trailers, log chains, pipe windlasses, small tools, hammers, small wrenches, "S" wrenches, stillson, Westcott, monkey wrenches, etc. Pipeline scrapers and scraper boxes, pipeline cleaning machines.

In Welded Lines

Complete welding apparatus, including oxygen, oxygen tanks and rubber hose. Cutting and welding tips and auxiliary tools. Welding copper.

In Marine Work

Barges and tug boats. Wire cables for holding lines in position against the current. River clamps.

In Gas Lines

Heavy type valves, orifice and proportional meters, meter houses, mercury "U" gauges, pressure recording instruments.

For Preservation

Preservation paint, preservation pipe covering.

For Stations

Structural steel for buildings, sheet metal for walls and roofs, paint for buildings, cement for concrete foundations and machinery blocks, concrete mixers and auxiliary power, usually gasoline engines; fire prevention equipment. Diesel type engines, power pumps operated by Diesels, boilers, steam pumps, steam condensers, steam traps, boiler feed pumps, water heaters (preheaters), high and low pressure gas regulators, gas meters, steam packing and gasket rubber, circulation pumps for cooling water, electric generators, electric water pumps, portable houses for employes, gas stoves for heating houses, ice and refrigerating plants, electric lighting equipment for plants and employes' houses, stock tanks from 500 to 55,000-bbls. capacity, gauge rods, record books, complete telegraph system, auxiliary telephone system, motor cars (for supervision), motor tires, pressure recording instruments, babbitt and lead for engine and pump bearings, lubricating oils, oil purifiers or separators for reclaiming lub oil, long-nozzled squirt cans, waste and rags, exhaust pots, boiler cleaning and caulking tools, traveling cranes (for repairing engines and heavy machinery), triple blocks for hoisting and lowering heavy machine parts, heavy log chains, storage tanks for lubricating oils, strainer boxes (for straining oil before it enters station), vacuum gauges.

For Communication

Complete telegraph and telephone equipment, including poles, wires, instruments, etc.

STEEL CORPORATION GETS NEW PROCESS

NEW YORK, Oct. 2.—The United States Steel Corp. has acquired from British interests the American patents to a new process of lining steel pipe to render it impervious to moisture, it was learned here today.

Acquisition of this patent gives the steel corporation an entry to a new field for the manufacture of underground pipe for water and gas mains. Hitherto this field has been closed to steel pipe with iron pipe used exclusively, it was said.

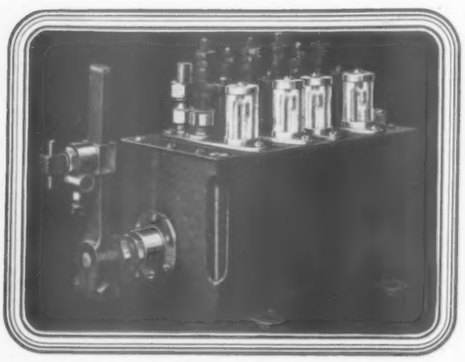
Cut Your Pumping Costs

By Using McCORD Force Feed LUBRICATORS

Pump line service requires dependable operation of pumps and engines if pumping costs are to be maintained at a minimum.

McCord Force Feed Lubricators supply the necessary lubrication 24 hours a day, 365 days of the year, preventing binding of pumps and wear of pistons.

Specify McCord Feed Lubricators, the standard of the oil fields. The National Supply Co. and branches will supply you.



BUILT FOR OIL FIELD USE;

TO GIVE LONG UNINTERRUPTED SERVICE WITHOUT ATTENTION

Distributed by

National Supply Co. and Branches

Lubricator Division of

McCord Radiator and Mfg. Company

Detroit, Michigan

Crossing the Mississippi River....

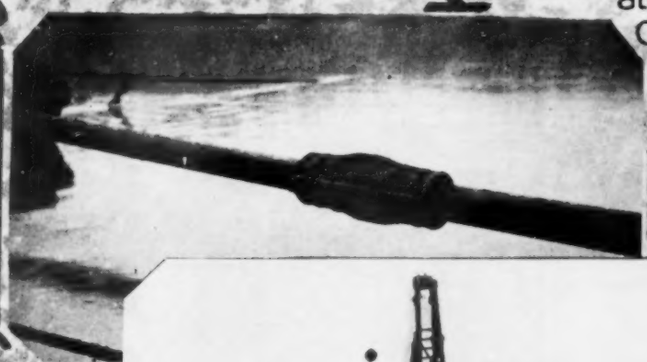
Pipe line clamp in place.

Welding joint of pipe on barge.

Diver laying 8-inch line.

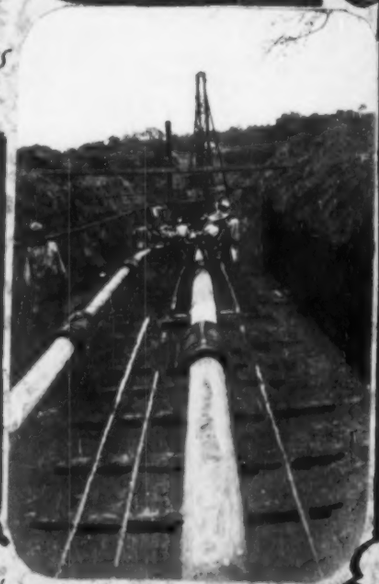
Diver working on 8-inch line.

Ready to check under-surface conditions



First joint at channel. The clamp weighs 800 pounds.

Pile driver aids work at river crossing.



Line ready to be pulled into river.

Transoceanic Transportation of Oils

Both Crude and Refined Products Carried in Extensive System Traversing the Entire Civilized World

By N. O. Fanning
New York Bureau, The Oil and Gas Journal, Room 543, 30 Church St., New York City

The transportation of crude and refined petroleum by water may be compared to the system of pipelines by which crude is transported by land. But instead of fixed pipelines, the means of transportation is that of ships in the form of bulk tankers. However, there are certain acknowledged routes of traffic to and from the principal shipping and receiving areas. Day in and day out these tankers are plying along these routes, carrying an ever-varying quantity of crude and refined oil, much like a pipeline can increase or decrease its runs in conformity with the demand or supply of petroleum.

In order to more clearly visualize the size and importance of transoceanic oil traffic, the various routes have been mapped out, as pipelines are mapped out on land maps, on the two maps accompanying this article. The first map shows the principal transoceanic pipelines of the western hemisphere; the second those of the eastern hemisphere. The shaded land areas on the maps denote the larger crude oil producing areas of the world.

Covers Vast Territory

Although pipeline transportation is a vital force in the oil business—and a growing force—ocean transportation is, potentially, a much bigger sphere of development. This is due in the first place to the rapid spreading out of producing, refining and consuming areas; but another outstanding factor in the growth of water transportation is its relative economy. It is roughly estimated that water transportation in bulk tankers for the same distance costs one-third to one-half that of pipeline transportation. Furthermore, pipelines can only handle crude petroleum, while bulk tankers can handle crude and refined with equal facility.

While the largest pipeline system in the world is that running from the Mid-Continent Field of the United States to the Atlantic Seaboard, a distance of about 1,500 miles, the principal ocean oil routes range from 1,800 to 8,400 miles in length. Bulk tankers have been loaded at the Gulf Coast destined for India, the distance covered being at least 15,000 miles, or almost two-thirds around the world. This is not a representative haul, however.

Principal Routes

The most important ocean route is that from the Gulf Coast to the Atlantic Coast of the United States, in which an average of 325,000 bbls. of crude and refined oil a day are transported a distance of approximately 2,000 miles. On no other route is that much oil carried. The second in importance is the route from the Gulf Coast to European markets, in which 120,000 bbls. of oil a day travel a distance of 6,000 miles.

The maps and charts which are contained in this article are devised for the purpose of giving as clear a conception as possible of the size and meaning of present water transportation of petroleum in bulk. A good deal of latitude had to be allowed in computing distances and the traffic, in as much as there is a good deal of variation in the course followed by tankers, while the traffic itself is subject to rapid fluctuations due to changes in supply and demand. Areas have had to be grouped in a very general way, in order to avoid a confusion of circles and lines and a multifarious jumble of figures, which would doubtless have been too lengthy to command attention. With these reservations, however, the reader is consigned to a perusal of what is believed to be the first group of maps and charts showing "transoceanic pipelines" of the world, which has ever been published.

All numbers in parentheses refer to numbered circles on the maps accompanying this article.

ESTIMATED TRAFFIC OF PRINCIPAL TRANSOCEANIC "PIPELINES"

(Daily Average in Barrels)

From—	To—	Traffic	Miles
U. S. Atlantic (4)	Europe (1)	50,000	4,800
U. S. Gulf Coast (6)	Europe (1)	120,000	6,000
U. S. Gulf Coast (6)	U. S. Atlantic (4)	325,000	2,000
U. S. Pacific Coast (8)	U. S. Atlantic (4)	60,000	5,800
U. S. Pacific Coast (8)	Far East (9)	50,000	6,600
Mexican Gulf Coast (7)	U. S. Atlantic (4)	115,000	2,400
Venezuela, Colombia, Trinidad (3)	U. S. Atlantic (4)	15,000	1,806
Venezuela, Colombia, Trinidad (3)	Europe (1)	15,000	5,200
Venezuela, Colombia, Trinidad (3)	U. S. Gulf Coast (6)	35,000	1,600
Persia (12)	Europe (1)	40,000	8,400
Persia (12)	Far East (9)	40,000	6,600
Dutch East Indies (10)	Far East (9)	70,000	2,000

Chart of Distances

All distances to given areas are averages between nearest and farthest points in such areas; figures in miles:

From—	To—	Distance	Map
U. S. Atlantic (4)	Europe (1)	4,800	1
U. S. Atlantic (4)	S. E. South America (2)	5,400	1
U. S. Atlantic (4)	No. South America (3)	1,800	1
U. S. Atlantic (4)	West Coast South America (5)	3,100	1
U. S. Atlantic (4)	U. S. Gulf Coast (6)	2,000	1
U. S. Atlantic (4)	Mexican Gulf Coast (7)	2,400	1
U. S. Atlantic (4)	U. S. Pacific Coast (8)	5,800	1
U. S. Gulf Coast (6)	Europe (1)	6,000	1
U. S. Gulf Coast (6)	S. E. South America (2)	5,700	1
U. S. Gulf Coast (6)	No. South America (3)	1,600	1
Venezuela, Colombia, Trinidad (3)	Europe (1)	5,200	1
Venezuela, Colombia, Trinidad (3)	S. E. South America (2)	4,200	1
Venezuela, Colombia, Trinidad (3)	Europe (1)	7,600	1
U. S. Pacific Coast (8)	Europe (1)	9,400	1
U. S. Pacific Coast (8)	Peru, Chile, Ecuador (5)	3,600	1
U. S. Pacific Coast (8)	U. S. Gulf Coast (6)	4,800	1
U. S. Pacific Coast (8)	Far East (9)	6,600	1
Russia, Rumania (13)	Europe (1)	6,000	2
Persia (12)	Europe (1)	8,400	2
Persia (12)	Far East (9)	6,600	2
Dutch East Indies (10)	Far East (9)	2,000	2
Dutch East Indies (10)	Europe (1)	8,800	2
India (11)	Europe (1)	9,100	2
India (11)	Far East (9)	3,000	2

The rapid growth in America's oil export business, and the necessity of transporting crude oil from distant points to existing refineries, are largely responsible for the sudden growth in oil tanker tonnage construction during the past few years. The recent development of oil production in Venezuela and Colombia (Group 3 on Map 1) provides an instance which carries a big meaning to ocean transportation of oil.

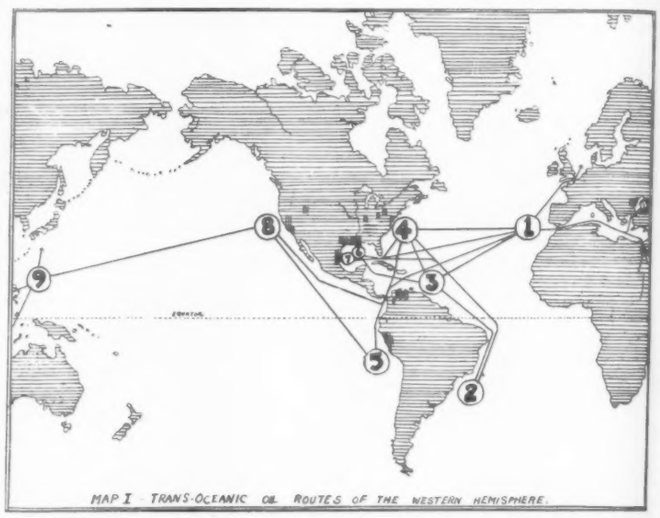
Colombia and Venezuela are nearer the Atlantic Seaboard than the United States or Mexican Gulf Coasts, the principal sources for crude for Atlantic Coast refineries at the present time. At the same time, these South American oil producing countries are not much farther from Europe than the Atlantic Coast of the United States, and are actually nearer to Europe than the Gulf Coast of the United States.

The existing oil tanker tonnage is capable of holding an aggregate amount of about 55,000,000 bbls. of crude and refined oil. Since 1914, world tanker tonnage has increased more than three fold.

Tanker Transportation

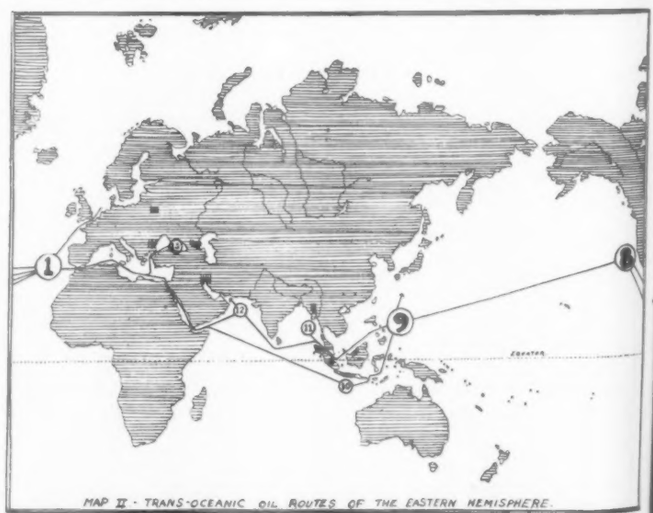
The first transoceanic shipment of oil was in 1861, when the rapid decrease of whales on the high seas and attendant shortage of sperm and whale oil had made the question of producing for the world a cheap, safe and efficient illuminent an important problem. It consisted

(Continued on Page C-184)



MAP I - TRANS-OCEANIC OIL ROUTES OF THE WESTERN HEMISPHERE.

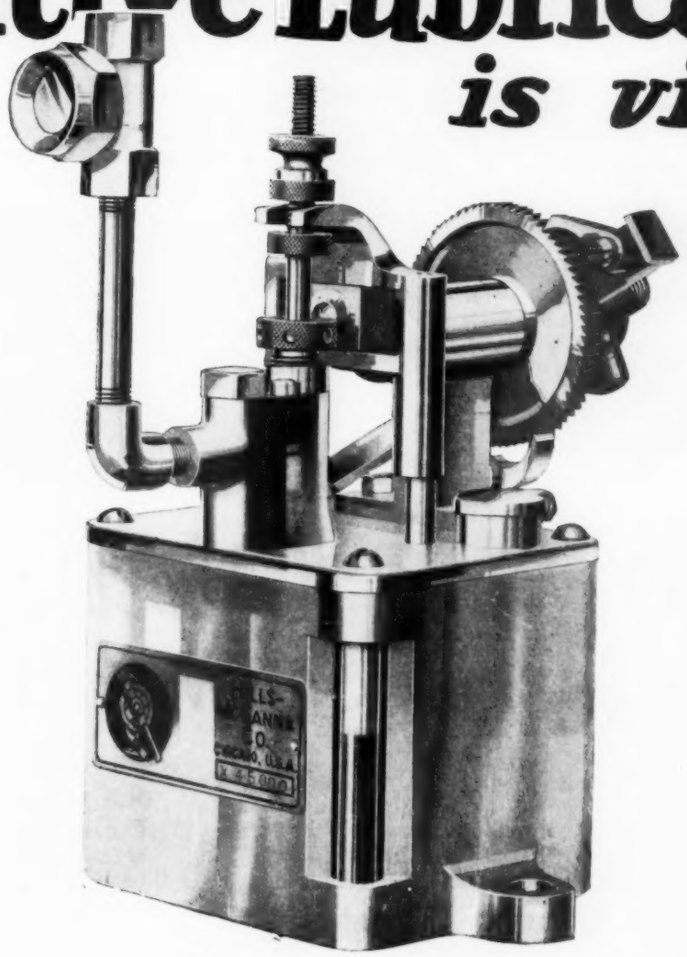
The numbers signify as follows: (1) Marketing area, comprising Europe, Near East and Africa. (2) Marketing area, comprising Argentina, Brazil, Uruguay, Paraguay. (3) Producing area, comprising Venezuela, Colombia, Trinidad. (4) Refining and marketing area, comprising the Atlantic Coast of the United States and Canada. (5) Producing, refining and marketing area, comprising Peru, Chile, Bolivia and Ecuador. (6) Producing, refining and marketing area, comprising the Gulf Coast of the United States. (7) Producing and refining area, comprising the Gulf Coast of Mexico. (8) Producing and refining area comprising the Pacific Coast of the United States and Canada. (9) Marketing area of the Far East, comprising principally Japan, China, India, Australia and New Zealand.



MAP II - TRANS-OCEANIC OIL ROUTES OF THE EASTERN HEMISPHERE.

The numbers signify as follows: (8) Producing and refining area comprising the Pacific Coast of the United States and Canada. (9) Marketing area of the Far East, comprising principally Japan, China, India, Australia and New Zealand. (10) Producing and refining area, comprising the Dutch East Indies. (11) Producing area of India. (12) Producing area of Persia. (13) Producing area of Russia and Rumania. (1) Marketing area, comprising Europe, Near East and Africa.

Positive Lubrication *is vital*



To be really positive a force-feed lubricator should do three things: First, measure or meter the exact quantity of oil to be fed; second, force it to the point of delivery regardless of pipe friction, viscosity of oil or pressure pumped against; and third, give visible evidence that oil is actually reaching destination.

Hills-McCanna Force-Feed Lubricators

Unfailingly Oil Every Moving Part

The single plunger pump principle with ball valves is recognized as a highly efficient metering device, the packed stuffing box for pumping against pressure is a much used engineering principle and a sight feed located past the pumping unit gives visible evidence of delivery.

All three features are incorporated in the Hills-McCanna force-feed lubricator.

Other Products

HILLS-McCANNA NO. 45

The Corrosion Resisting Bronze With The Strength Of Steel

—and refinery products made of it, described and illustrated in our new catalog—"Hills-McCanna Non-Ferrous Alloys and Products."

Write for your copy.

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First in the Field of Force-Feed Lubrication

NORRIS QUALITY COSTS NO MORE

NORRIS *Quality* Swedge Nipples *and* Bull Plugs

NORRIS Swedge Nipples are made of the finest materials, lathe turned to exact size before threading, each fitting is reamed to required interior dimension. More stock is forged in the nose of Norris Bull Plugs than in any other plug, an inside plunger being used which furnishes a perfect weld on the interior as well as exterior. Extra care in manufacture eliminates burrs found in other makes.

DURING process of manufacture each fitting must undergo five inspections—a reason no Norris Swedge Nipple or Bull Plug has ever been known to leak.

Threads are treated with a special rust preventive, the body being given a heavy coating of lead and oil, gray in color.

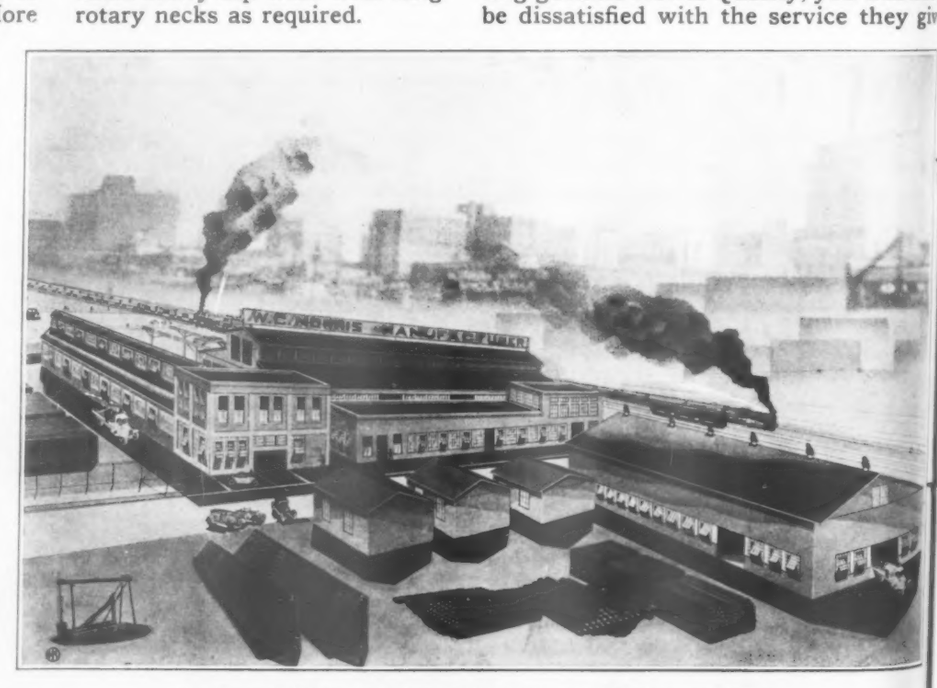
NORRIS Swedge Nipples are also made in seamless, extra heavy lap weld and double extra heavy lap weld with long rotary necks as required.

CALL for Norris Swedge Nipples and Bull Plugs by name and look for the Norris Quality Mark to be sure you are getting genuine Norris Quality, you will never be dissatisfied with the service they give.

W. C. Norris is the largest manufacturer of Swedge Nipples and Bull Plugs in the world, enabling us to sell quality fittings such as these at the same price of an inferior article, the greater manufacturing cost being absorbed by the larger output.

W. C. NORRIS MANUFACTURER QUALITY PRODUCTS TULSA, OKLA.

Look for the Norris Quality Mark, it is your guarantee.



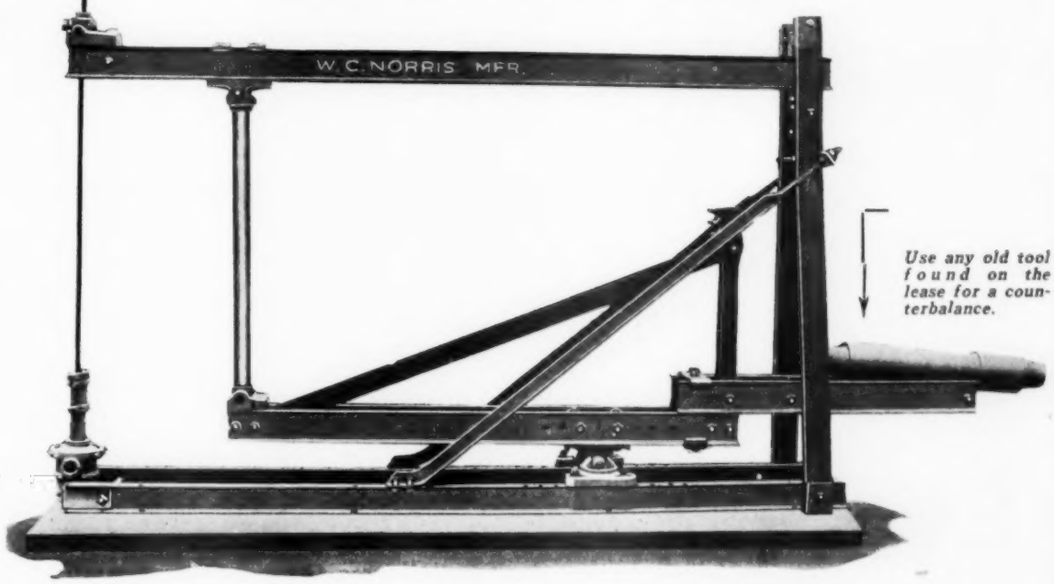
The General Offices and Shops of W. C. Norris Manufacturer, "The Home of the OK Jack." Equipped with the most modern machinery —today a steady production flow is delivering some of the finest equipment used in the Petroleum Industry. Two notable examples being the new Norris Giant OK Jack and Norris Quality Swedge Nipples and Bull Plugs used everywhere.

Made in the Shops nearest the oil fields.

AND PAYS BIG DIVIDENDS IN SERVICE

The New Norris Giant and OK Jack

NORRIS OK 5 *Little Giant*



THIS new Super Jack built along the same lines as the already famous Norris OK Jacks, is designed to give you continuous pumping service on your deep wells. The frame has been enlarged and constructed of oversize materials. It has been amply reinforced to take care of the excessive strain due to deep pumping.

IN designing this new Jack we have kept constantly in mind what has been found necessary in construction and weights of materials for a Jack that will deliver day in and day out service on deep production. Consequently we can now offer you a Jack that will pump your deep wells with the same economy, dependability and efficiency that the other Norris OK Jacks pump shallower wells.

THE Chart at the right lists various length rod line pulls in inches with the corresponding Jack stroke. Study it carefully and you will readily see that the new Norris Jack will deliver an unequaled performance record. The length of the Giant Beam is 12 ft., thus making stroke describe a wider arc, resulting in an almost *straight* lift. The length of the OK 5 (Little Giant) Beam is 10 ft. Both Jacks are equipped with the Norris adjustable structural steel frame.

IT will pay you to give this Jack a fair test on one of your leases. Learn what it will do under actual working conditions. Compare your production and expense records, then you will see why so many companies specify Norris OK Jacks on all their wells.

Performance Chart

Showing Length of Jack Stroke at Different Length Pull on Rod Line

NORRIS GIANT	*NORRIS OK 5 (Little Giant)*
Rod Line Pull 18″ Jack Stroke 44″	Rod Line Pull 18″ Jack Stroke 42″
Rod Line Pull 20″ Jack Stroke 50″	Rod Line Pull 20″ Jack Stroke 46″
Rod Line Pull 24″ Jack Stroke 60″	Rod Line Pull 24″ Jack Stroke 54″
Weight with Frame, 2,010 lbs.	Weight with Frame, 1,579 lbs.

W. C. NORRIS MANUFACTURER

NORRIS QUALITY PRODUCTS

PIPE LINE CONTRACTORS

OKLAHOMA CONTRACTING CO.

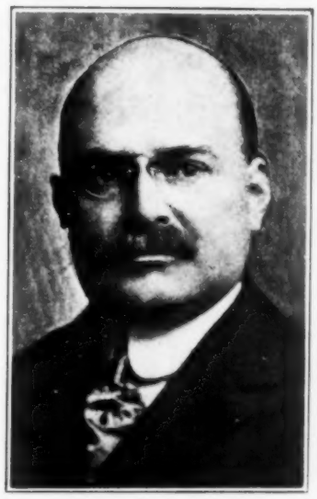
WELDALINE CONTRACTING CO.

801 Mayo Bldg.
Tulsa, Okla.

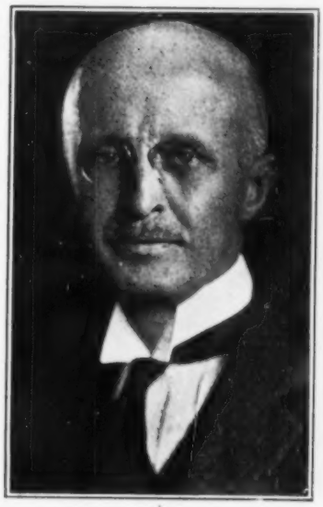
515 Thomas Bldg.
Dallas, Texas

Prominent Pipe Line Company Officials

P. R. APPLEGATE
Assistant to President, Northern Group Pipe Lines



D. S. BUSHNELL
President, Northern Group Pipe Lines



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General Counsel, Northern Group Pipe Lines

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Secretary, Northern Group Pipe Lines

C. H. CLEAVER
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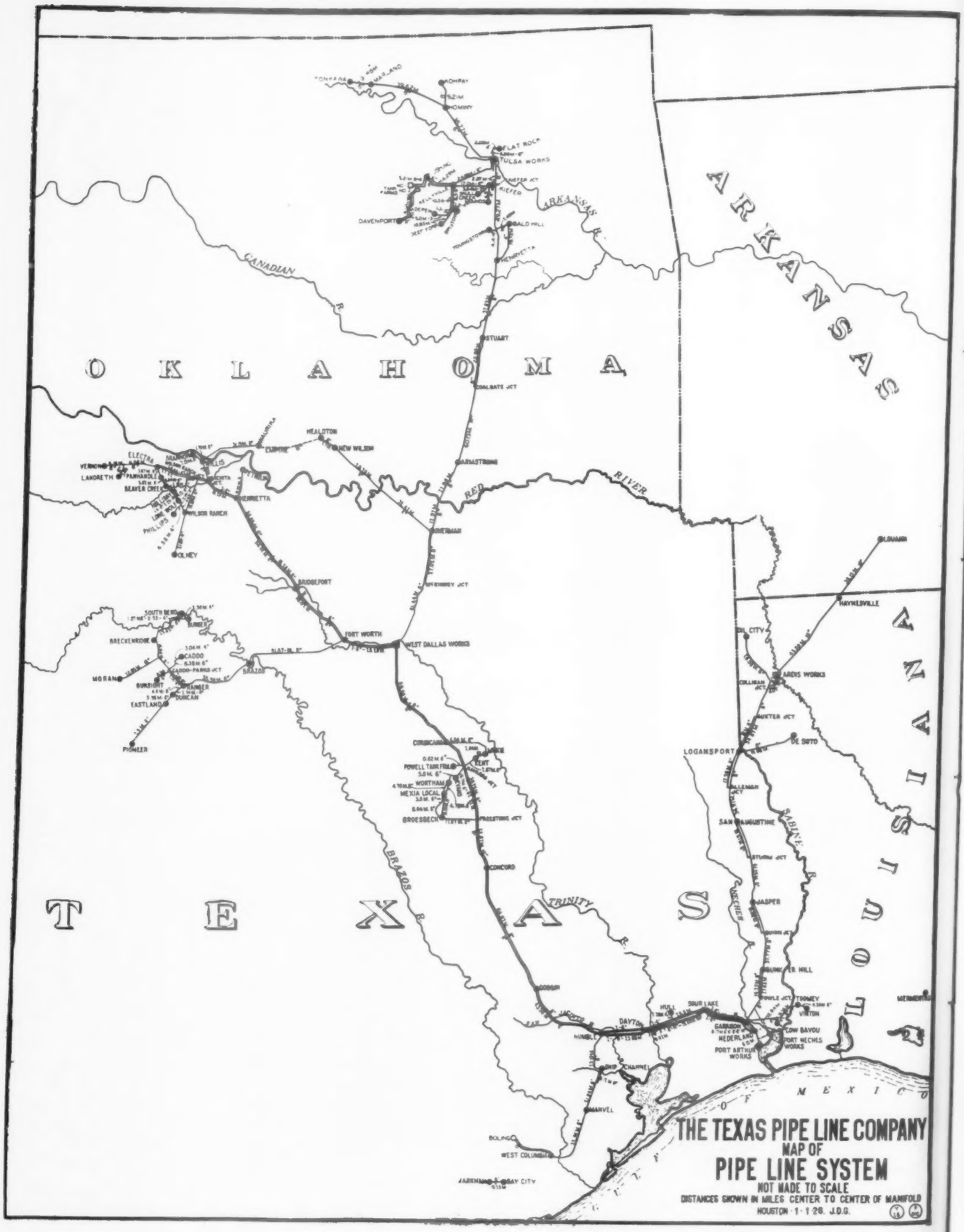
B. A. TOWL
Manager, Real Estate and Tax Dept., Northern Group Pipe Lines

W. F. LIVINGSTON
Trasurer, Northern Group Pipe Lines


OKLAHOMA
TEXAS
ARKANSAS
LOUISIANA
CANADIAN R.
RED RIVER
BRAZOS R.
TRINITY R.
SABINE R.
ARKANSAS R.
G. OF MEXICO
TULSA WORKS
FLAT ROCK
KIEFER
DAVENPORT
HENRIETTA
STUART
COALGATE JCT
HEALDTON
ELECTRA
VERNON
LANDRETH
PANHANDLE
BEAVER CREEK
WILSON RANCH
PHILLIPS
OLNEY
BRIDGEPORT
ARMSTRONG
BURKBURNETT
SHERMAN
DENISON JCT
FORT WORTH
WEST DALLAS WORKS
BRECKENRIDGE
MORAN
BURKETT
EASTLAND
RANGER
DUNCAN
CADDO
CADDO-PARKS JCT
PIONEER
CORSICANA
POWELL TANK FIELD
WORTHAM
MEXIA LOCAL
BROESBECK
TROLSTONE JCT
CONCORD
HAYNESVILLE
OIL CITY
ARDIS WORKS
COLUMBIA JCT
BAXTER JCT
DE SOTO
LOGANSPORT
SAN AUGUSTINE
JASPER
BEAUMONT HILL
TROUTMAN
VIRTON
DAYTON
SOUR LAKE
GARRISON
NEDERLAND
PORT ARTHUR WORKS
COW BAYOU
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WEST COLUMBIA
GULF OF MEXICO
THE TEXAS PIPE LINE COMPANY
MAP OF
PIPE LINE SYSTEM
NOT MADE TO SCALE
DISTANCES SHOWN IN MILES CENTER TO CENTER OF MANIFOLD
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Quick Service—Low Price on GREENSPON'S Pipe!

WHEN you lay a pipe line you want the best pipe you can get at the lowest possible price, and you want delivery on time. That's what we offer!

Lay Greenspon's ODEE pipe, or any of our used pipe or casing, alongside any other you please. Compare them. See how thoroughly our rigid inspection insures perfect material, threads and couplings. Our ODEE pipe for gas lines is delivered in double lengths, with perfect ends for quick, first-class field welding—double lengths eliminate approximately 50% of field work.

We have new and used pipe in all sizes—every piece guaranteed. Casing in 5⅛" to 15½", warranted to give service equal to new; equipped with new threads and collars. Quick shipments made from any of our branches.

Write for prices now!

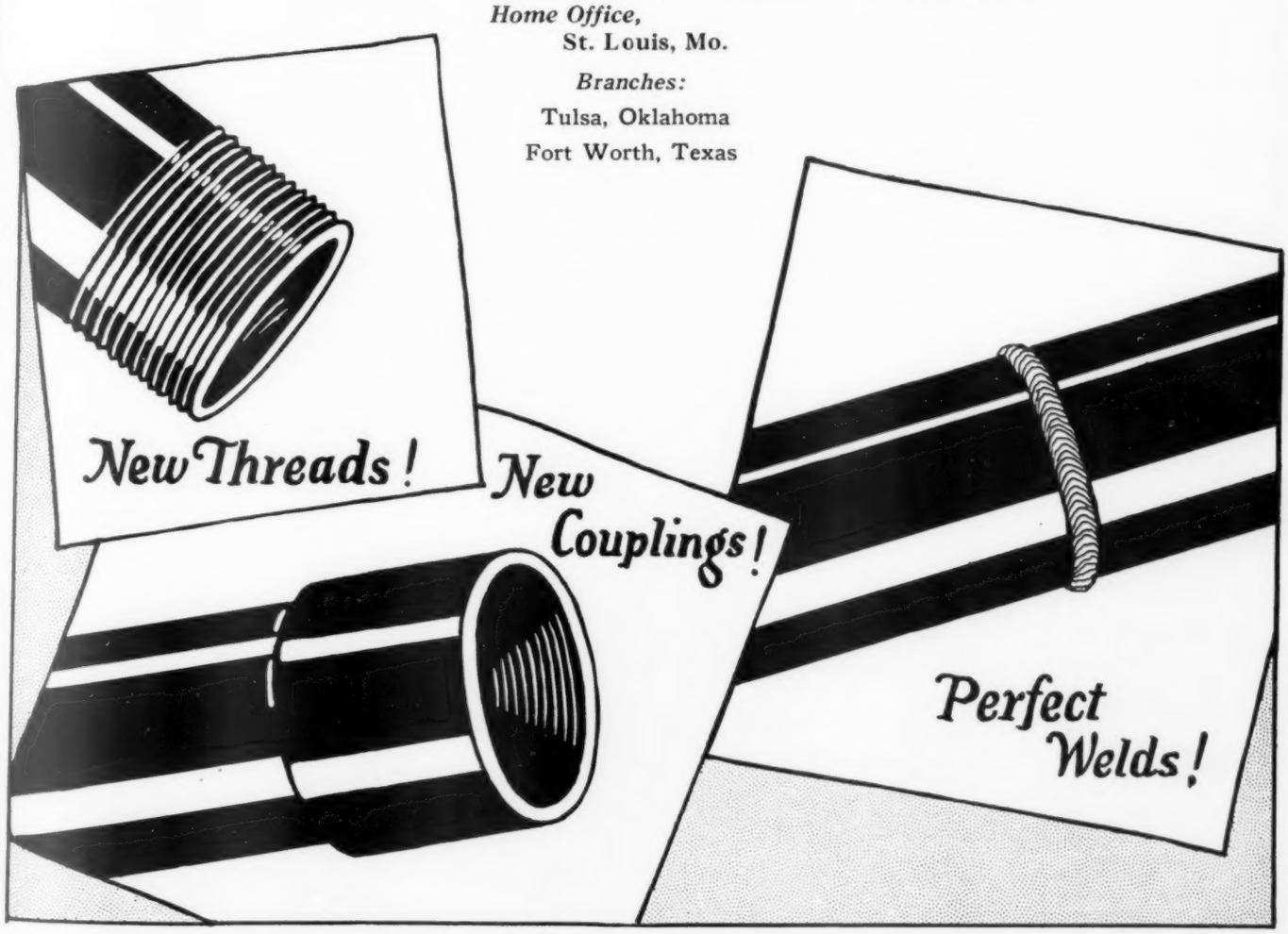
JOS. GREENSPON'S SONS
IRON AND STEEL COMPANY

Home Office,
St. Louis, Mo.

Branches:
Tulsa, Oklahoma
Fort Worth, Texas

Used Pipe Purchased!

We are always in the market for used pipe and casing. No string or line too large for us to handle.



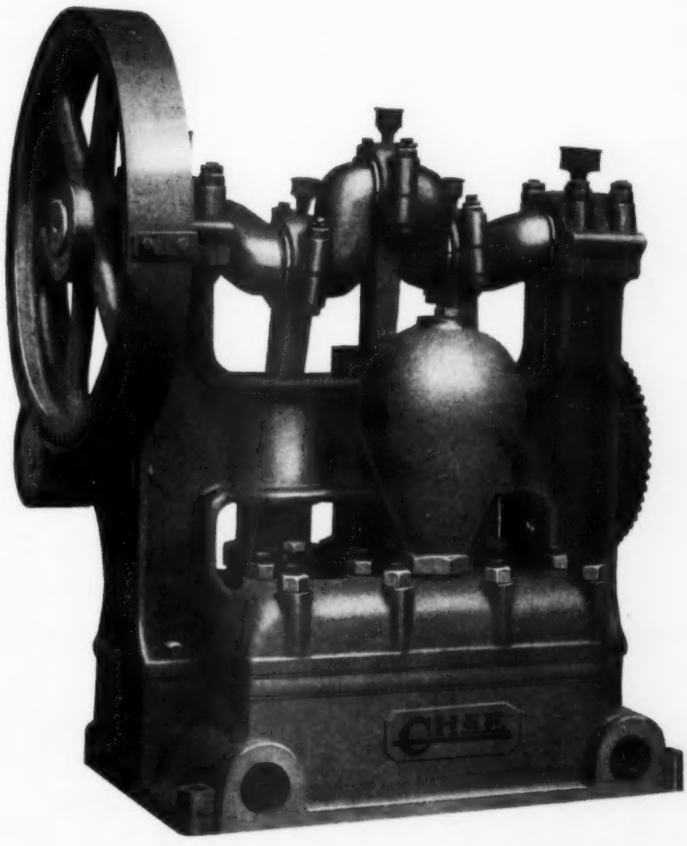
KANSAS
Lyman
Loading Rack
Burbank Pool
Empire Sta
Ponca City
Bartlesville
Nowata
Tonkawa Sta.
9.91 mi.
6"
Buffalo Head
39.62 mi.
8"
Pawhuska
Kohpay Sta.
Graham Pool
9.21 mi.
Hominy Pool
Hominy Jct.
Osage County Pools
Hominy
8"
Claremore
Maramec Pool
Quay Pool
No4 Tank Farm
No5 Tank Farm
Cushing
Cushing Sta
Cushing Pool
No1 Tank Farm
No2 Tank Farm
Davenport Sta.
Oklahoma City
Deep Fork Sta.
Skullcr Sta
Bristow Sta.
Beggs Pool
Youngstown Sta
Okmulgee Co Pools
Tiger Flats Pool
Henryetta Pool
Artesian Pool
Henryetta Sta
Grayson Pool
2.08 mi.
Bald Hill Pool
Bald Hill Sta
Morris Pool
6.0 mi.
Muskogee
OKLAHOMA
Okemah Pool
Lamar Pool
37.83 mi.
Stuart Sta
8" Loop 22.63
Coalgate Junct.
60.13 mi.
N
Armstrong Sta.
Headston Pool
Empire P.L.Co Sta
Hewitt Pool
Wilson Sta & Tank Farm.
Ardmore
Empire
Red River
19.74 mi.
21.56 mi.
Burns Flat
Willis Sta
TEXAS
Sherman Sta.
The Texas Pipe Line Company
Of Oklahoma
MAP SHOWING PIPE LINE SYSTEM
Tulsa, Oklahoma, Jan. 23, 1922.
Revised - Jan. 25, 1923
do - Jan. 14, 1925
do - Apr. 14, 1926 Index No. 38103

C.H.&E. No. 11 Triplex Pump

This No. 11 Triplex Pump with Waukesha 4-cylinder gasoline engine mounted is the very latest development in a pumping plant. It is a large slow-speed heavy-duty outfit with a capacity of forty-two hundred gallons per hour. Total working head nine hundred twenty-five feet, maximum working pressure four hundred pounds. Engine and pump connected through a spring coupling. Outfit mounted on wide faced wheels and carries a strong steel lock-up house. Total weight of outfit thirty-seven hundred pounds.

"Heavy Duty" Triplex Pump

This pump is built for a continuous working pressure of four hundred pounds. It has large valve and water passages. All valves are easily accessible by removing one cover plate. The plungers are outside packed. Large pump crank-shaft and all gears are accurately machine cut.



Pumps CARRIED IN STOCK
IMMEDIATE SHIPMENT

Manufactured by

C. H. & E. MANUFACTURING CO., Inc.
MILWAUKEE, WISCONSIN

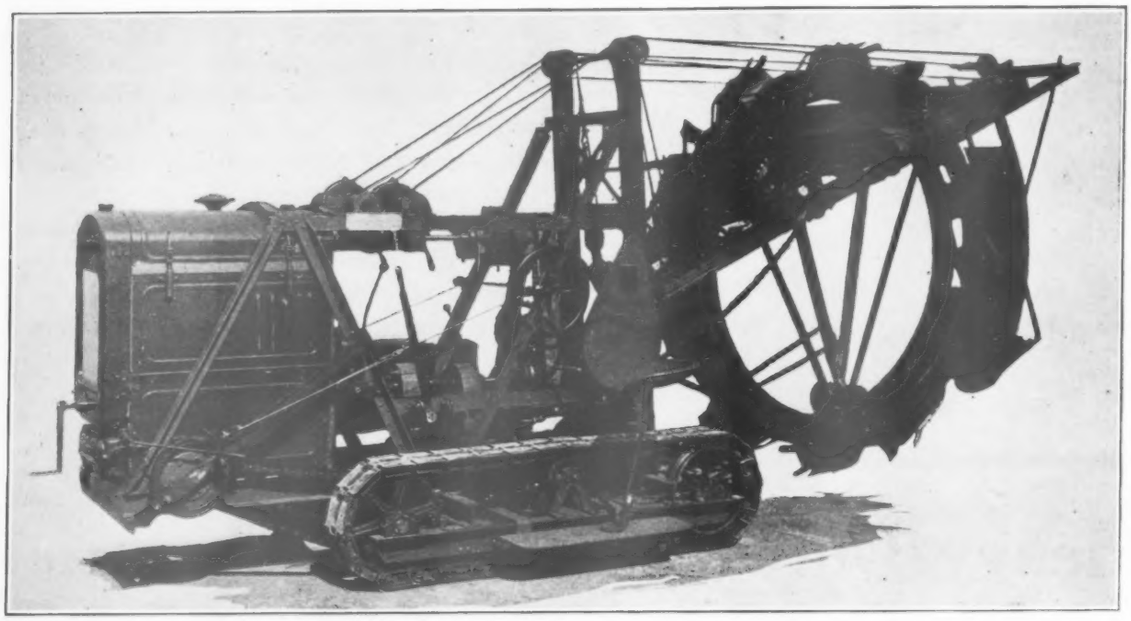
SOLD BY

C. F. CAMP CO.

ARCHER & DETROIT **Phone 2-6137** **TULSA**

THE BABY DIGGER

Reg. U. S. Pat. Office



Length—17 ft. 2 in. Width—4 ft. 9 in. Height—8 ft. 2 in.

Ideal for OIL LINE and GAS LINE Trenches

POWERFUL—Digs in all kinds of soil.
RUGGED—Stands up under tough going.
SMALL—Requires a minimum clearance.
LIGHT—Weighs less than four tons.

Easily moved on a trailer, on a truck, or on its own power.

CORRECT DESIGN—BEST MATERIALS THROUGHOUT

The Cleveland Trencher Co.

"Pioneers of the small trencher"

20100 St. Clair Ave. Cleveland, Ohio, U. S. A.

Let Us Send You Complete Information

Tank Car Investment Is $300,000,000

Of the 144,898 Cars in Operation, More Than 100,000 Are Used for the Transportation of Petroleum

There are 144,898 tank cars in use in the United States, probably 80 per cent of which are of either 8,000 gallons or 10,000 gallons capacity. There are some 12,000 and 14,000-gallon cars, and some between 6,000 and 8,000 gallons—the number smaller than 6,000 gallons is negligible.

The present average price of an 8,000-gallon car, latest type construction and equipment, is about $1,700, f.o.b. factory, which is some place in the East. In addition there is about $200 freight to Mid-Continent points, thus making the total cost about $1,900 per car. A 10,000-gallon car costs about $1,925, plus approximately $200 freight, or about $2,125 "laid down."

Investment $300,000,000

If the tank cars in the United States today were replaced, at present prices, the total would be about $300,000,000.

The four following classifications of operation account for over 126,000 cars:

55 oil companies	81,972
19 leasing companies, including car manufacturers	24,729
19 railroad companies	11,572
19 companies, using for other than petroleum	8,448
Total	126,721

In addition to these 55 oil companies, there are a large number of smaller oil companies that operate an aggregate of over 10,000 cars. Nearly all of the leasing companies are accounted for above. The 19 railroad companies account for nearly all tank cars operated by railroads. The remaining cars are accounted for by the companies using cars for transporting products other than petroleum.

Major Part for Petroleum

In addition to the about 82,000 cars used exclusively for petroleum by the oil companies, the larger part of the almost 25,000 cars operated by leasing companies is used to transport petroleum products—and the same is true of the more than 11,000 cars operated by railroad companies. This means that the oil industry is today using well over 100,000 tank cars to convey crude oil and its products.

The natural gasoline industry, which, in its larger aspects, is still a "young" industry, has done much to bring about refinements in tank car construction that insure almost perfect conservation, as well as safety, in transportation. The latest type, heavily insulated natural gasoline tank car is the highest type tank car in service today. With motor fuel the increasingly dominant petroleum product, the total cars in gasoline service are probably increasing faster than in the crude and fuel oil service.

In checking the cars opposite the names of the companies in the accompanying tables, it should be kept clearly in mind that the figures are for April 3, 1925—and that since that date many of the companies have either added cars or sold cars—that many new leases have been made and old ones have expired. It should also be understood that these figures do not necessarily indicate "ownership" of the cars.

Table 1.—Some of the larger oil companies operating tank cars for the transportation of crude oil and its liquid products. Data from Boyd's Circular No. 6-S, effective April 3, 1925. Tables 2, 3 and 4 compiled from same source.

American Refining Co., Wichita Falls, Tex.	347
Associated Oil Co. (Tide Water), San Francisco, Calif.	265
Barnsdall Refining Co., Tulsa, Okla.	507
Caddo Central Oil & Refining Co., Shreveport, La.	564
Carson Petroleum Co., Chicago, Ill.	252
Central Refining Co., Lawrenceville, Ill.	291
Champlin Refining Co., Enid, Okla.	909
Chestnut & Smith, Tulsa, Okla.	752
Cities Service Co., Boston, Mass.	243
Constantin Refining Co., Tulsa, Okla.	649
Cosden (Mid-Continent Petroleum Corp.), Tulsa, Okla.	2,271
El Dorado Refining Co., El Dorado, Kan.	289
Freeport & Mexican F. O. Corp., Houston, Tex.	332
Galena Signal Oil Co. of Texas, Houston, Tex.	262
Great Southern Refining Co., Lexington, Ky.	380
Gulf Refining Co., Pittsburgh, Pa.	2,714
Humble Oil & Refining Co., Houston, Tex.	288
Imperial Refining Co., Tulsa, Okla.	436
Indiahoma Refining Co., St. Louis, Mo.	620
Indian Refining Co., Lawrenceville, Ill.	1,540
Kanotex Refining Co., Kansas City, Mo.	200
Lion Oil & Refining Co., Kansas City, Mo.	576
Louisiana Oil Refining Co., Shreveport, La.	780
Magnolia Petroleum Co., Dallas, Tex.	1,032
Marland Refining Co., Ponca City, Okla.	979
Mexican Petroleum Corp., New York City	1,535
Mutual Oil Co. (now Continental), Denver, Colo.	500
New England Oil Refining Co., Boston, Mass.	248
New Orleans Refining Co., New Orleans, La.	442
Noble Oil & Gas Co., Tulsa, Okla.	498
Panhandle Refining Co., Wichita Falls, Tex.	328
Paragon Refining Co., Toledo, Ohio	636
Pennoil Co., Oil City, Pa.	274
Phillips Petroleum Co., Bartlesville, Okla.	712
Pierce Oil Corp., St. Louis Mo.	1,597
Producers & Refiners Corp. (Prairie Oil & Gas), Tulsa, Okla.	859
Prudential Oil Corp., Baltimore, Md.	300
Pure Oil Co., Columbus, Ohio	2,942
Roxana Petroleum Corp., St. Louis, Mo.	1,852
Sapulpa Refining Co. (now Continental), Denver, Colo.	444
Shaffer Oil & Refining Co., Chicago, Ill.	630
Shell Co. of California, San Francisco, Calif.	382
Shreveport Producing & Refining Co., Shreveport, La.	244
Simms Oil Co., Dallas, Tex.	584
Sinclair Refining Co., New York City	4,664
Union Petroleum Co. (Sinclair), Chicago, Ill.	188
Skelly Oil Co., Tulsa, Okla.	992
Southern Pacific Co., San Francisco, Calif.	2,610
Texas Company, The, New York City	5,093
Texhoma Oil & Refining Co., Wichita Falls, Tex.	191
Tidal Refining Co., Tulsa, Okla.	515
Tidal Western Oil Corp., Tulsa, Okla.	250
Transcontinental Oil Co., Tulsa, Okla.	1,248
Union Oil Co., Los Angeles, Calif.	583
Union Tank Car Co., New York City	31,761
United Central Oil Corp., Houston, Tex.	215
Waite Phillips Co. (Barnsdall), Tulsa, Okla.	459
White Eagle Oil & Refining Co., Kansas City, Mo.	647
Total, 55 companies	81,972

The table indicates only the "cars operated" by the different companies—and the number opposite any company may or may not indicate the number of cars that the company actually owned on April 3, 1925.

Union Tank Car Co.

In Table 1 it is interesting to note that the Union Tank Car Co. operated 31,761 cars. This company was organized in 1891 to handle the tank car shipments of all of the units of the old Standard Oil Co. It was, and still is, an entirely distinct organization from the companies forming the Standard Oil group. The cars operated by the Union Tank Car Co. (usually called the Union Tank Line) are so nicely balanced to the needs of the different companies that there probably have been few times when it has had a surplus of cars—and during periods of the bringing in of new fields and of heavy seasonal demands for refined products it has frequently been forced to go into the open market and rent cars.

Table 2 stands in direct contrast with Table 1, in that in Table 1 the greater part of the 82,000 cars are obviously owned by the oil companies and used for transporting their own products, while in Table 2 the leasing companies are, in no sense, engaged in the oil business—the larger part of their business is renting or leasing cars to the oil industry—the remainder being used by other industries. It is interesting to note that three manufacturing companies—General American, Pennsylvania and Standard Oil—operated about 70 per cent of the total (24,729) cars.

Table 2.—Companies leasing tank cars for miscellaneous uses, mostly for transporting petroleum products. List includes several manufacturers of tank cars who also lease cars.

American Tank Line, Cleveland, Ohio	604
Conley Tank Car Co., Pittsburgh, Pa.	744
Federal Tank Line, Pittsburgh, Pa.	624
Continental Tank Car Co., Tulsa, Okla.	352
General American Tank Car Corp., Chicago, Ill.	8,903
Interstate Tank Car Corp., New York City	368
Keith Railway Equipment Co., Chicago, Ill.	828
Liquids Dispatch Line, Chicago, Ill.	456
National Tank Car Co., Chicago, Ill.	335
North American Car Co., Chicago, Ill.	888
Peerless Transit Co., Cleveland, Ohio	1,326
Pennsylvania Tank Line, Sharon, Pa.	4,804
Quaker City Tank Line, St. Louis, Mo.	838
Shippers Car Line, New York City	468
Standard Tank Car Co., Sharon, Pa.	3,091
Total, 15 companies	24,729

Railroads' Interest

Apparently the railroad companies have found that it is good policy to operate tank cars, as 19 companies account for nearly 12,000 cars.

Table 3.—Railroad companies operating tank cars for transporting miscellaneous products, largely petroleum.

Atchison, Topeka & Santa Fe	2,845
Bay Terminal	301
Chicago & North Western	216
Chicago, Burlington & Quincy	334
Delaware River & Union	785
East Jersey Railroad & Terminal	650
Fort Worth & Denver	96
Great Northern	252
International Great Northern	200
Kansas City Southern	252
Midland Valley	132
Missouri, Kansas & Texas	318
Pennsylvania	486
Southern Pacific Co.:	
California division	2,329
Louisiana division	196
Texas division	568
Texas & Pacific	316
Union Pacific	1,136
Western Pacific	160
Total, 19 companies	11,572

Some of these railroad companies use their cars largely for hauling fuel oil for their own fuel oil burning locomotives or for other uses. The two largest operators are the Santa Fe and the Southern Pacific, each of which has about 3,000 cars. It is interesting that nearly all of these railroad companies are west of the Mississippi River—and that their point of contact with the oil industry is much more direct than the companies listed in Table 2.

Rate of Compensation

In handling tank cars, railroads allow the owners 1½ cents a mile for every mile the car travels, both loaded and empty, but with the understanding that for every mile the car travels empty it must travel a mile loaded, and over the same system. Once a month the railroad companies pay the car owners for both loaded and empty mileage, regardless of whether or not they balance. However, if the empty mileage exceeds the loaded mileage the owner is given six months in which to equalize the mileages— and if the mileages have not been equalized by the end of the second six months the company operating the cars is billed, at "commercial rates," for the amount of the excess empty mileage. The commercial rate varies in the different freight classification territories—for example, a company in the Mid-Continent ships to points east of the Mississippi River. If at the end of the year the total excess empty mileage is 80,000 miles, of which 50,000 is west of the Mississippi and 30,000 east, the operator is billed as follows:

Eastern excess, 30,000 miles, at 9½c per mile	$ 2,850
Western excess, 50,000 miles, at 16½c per mile	8,250
Total	$11,100

The commercial rates were really 8 cents and 15 cents, but 1½ cents was added in order to return to the railroad company the 1½ cents a mile that had already been paid on the presumption that the excess empty mileage would be offset by loaded mileage before the end of the 12 months.

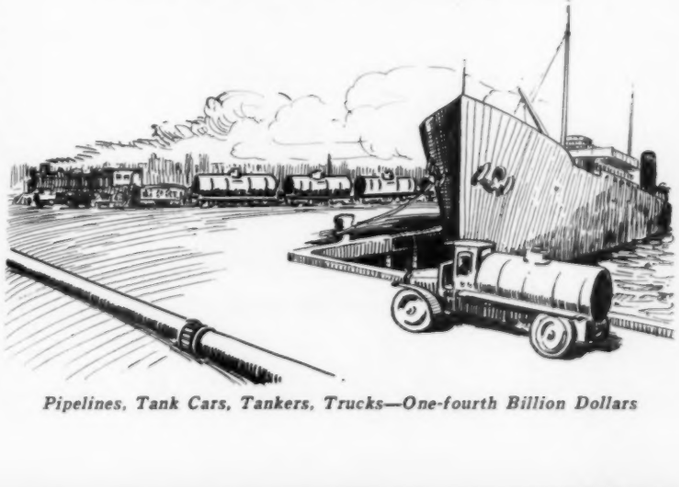
The entire proposition is based on the presumption that an empty tank car should be returned over exactly the same route over which it traveled loaded—and in which event the two mileages would balance. If there is an excess of loaded mileage over empty mileage, the operator gets no credit for it—but if there is an excess of empty mileage over loaded mileage he must pay for it.

Car Repair Departments

Most large owners of tank cars maintain their own car repair departments, and cars are carefully inspected before starting on journeys, thereby eliminating railroad companies having to make repairs in transit. There is a fixed schedule of prices for repairs, uniform throughout the country, that the railroad companies are permitted to make. In practice it has been found that, on a cost basis, car operators care for about three times as many repairs as do the railroads. As an accident could easily be more expensive to the railroad company than to the tank car operator, it is obvious that a railroad company should be permitted, in self-defense, to repair a car that gets out of order while in transit.

Car rentals vary in accordance with the supply of and the demand for tank cars. Flush oil fields, oversupply of refined products, unusually strong markets, etc., are factors that increase or decrease car rental rates. Cars are leased for periods ranging one trip to five years—and the monthly rental depends upon current conditions. Probably $30 a month is a fair average of today's rental market.

ANNUAL EXPENDITURE FOR TRANSPORTATION



Pipelines, Tank Cars, Tankers, Trucks—One-fourth Billion Dollars

Prominent Pipe Line Company Officials

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Chairman of the Board
Sinclair Pipe Line Co.

JOHN R. MANION
President, Sinclair Pipe Line Co.

H. F. SINCLAIR
Director, Sinclair Pipe Line Co.

EARL W. SINCLAIR
Director, Sinclair Pipe Line Co.

R. B. HANNA
Secretary-Treasurer, Sinclair Pipe Line Co.

—Photo by J. L. Rivkin
J. F. BLAKE
General Superintendent,
Sinclair Pipe Line Co.

D. W. HARRIS
Treasurer, Empire Pipe Line Co.

WILLIAM GROUNDWATER
Manager, Transportation Dept.,
Union Oil Co. of California

TANK CARS
FOR ALL PURPOSES

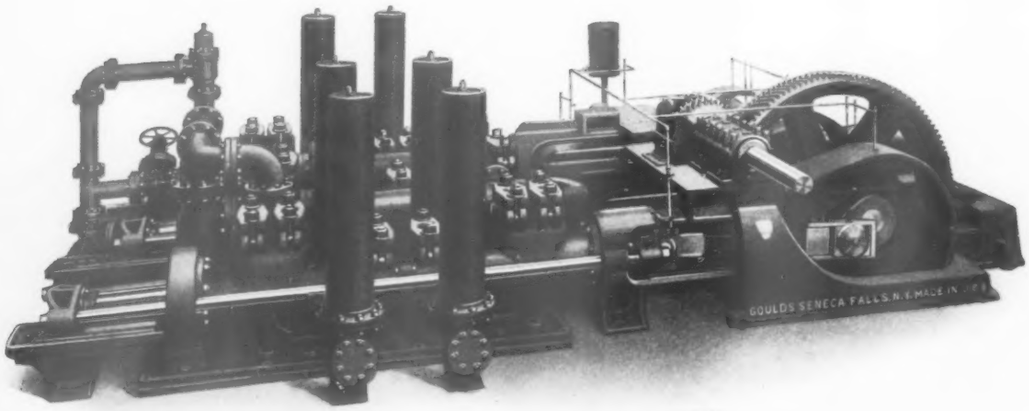
Above are recent "Car Foundry" constructions for petroleum products, sulphuric acid, liquid chlorine, sulphur dioxide, anhydrous ammonia, ethyl chloride, propane, benzol, asphalt, etc. Inquiries are invited concerning ANY type of tank car for ANY purpose.

AMERICAN CAR AND FOUNDRY COMPANY

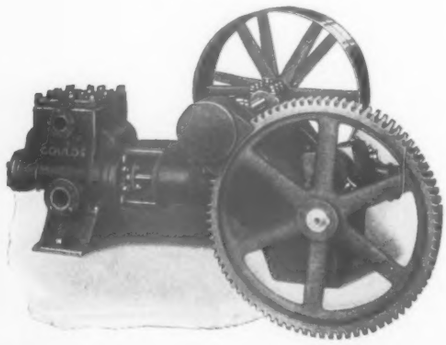
New York, 30 Church Street **Chicago, Railway Exchange Building** **St. Louis, 915 Olive Street**

A Complete Pumping Service

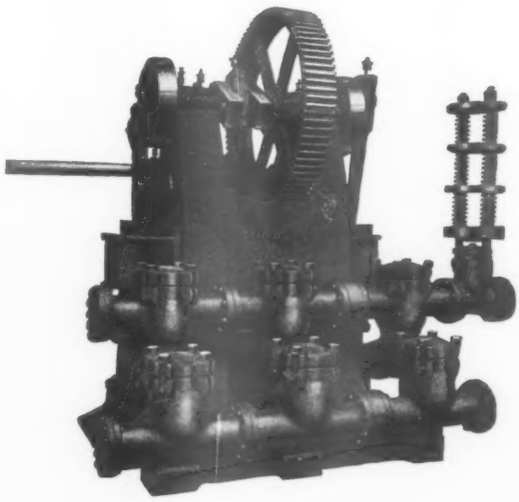
for the Petroleum Industry



STATION PUMPS: Horizontal double-acting, outside packed plunger type, either duplex or triplex. Capacities up to 25,000 barrels per 24 hours. Pressures up to 1000 lbs. Complete specifications in Bulletin 115.



GATHERING PUMPS: Horizontal, double-acting, duplex piston packed types. Capacities 3100 to 6500 barrels per 24 hours. Pressures 400 to 600 lbs. Certain sizes are so designed that cylinder liners can be changed to increase or decrease the pump capacity in proportion to the pressure. Specifications in Bulletin 115.



STATION and TRANSFER PUMPS: Vertical, single acting triplex plunger type. Capacities up to 16,000 barrels per 24 hours. Pressures up to 1500 lbs. Complete specifications in Bulletins 103 and 116.

WATER PUMPS: Double acting, single cylinder types. Capacities up to 114 g.p.m. Pressures up to 75 lbs. Specifications in Bulletin 100.

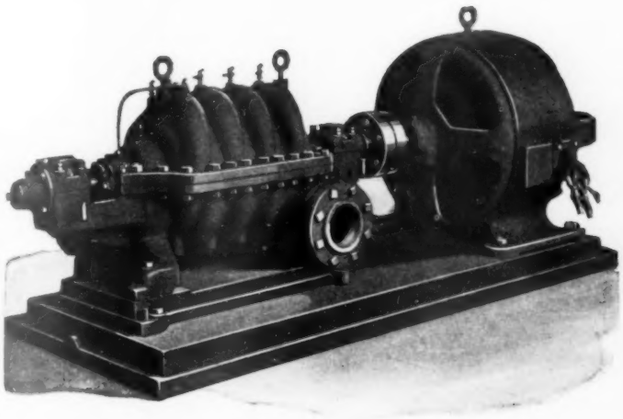
Single acting triplex type. Capacities up to 625 g.p.m. Pressures up to 300 lbs. Specifications in Bulletin 101.

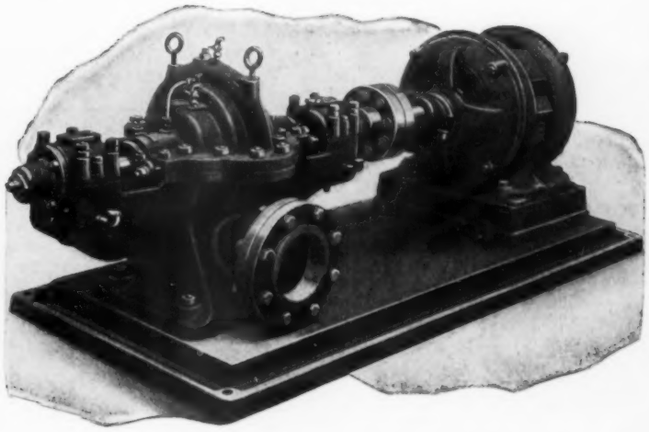
GOULDS PUMPS Inc.

GOULDS

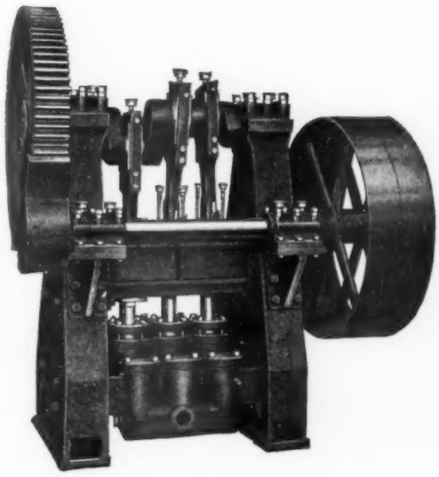
Pumps for Field Work

Main Line Stations—Refineries—Gasoline Plants

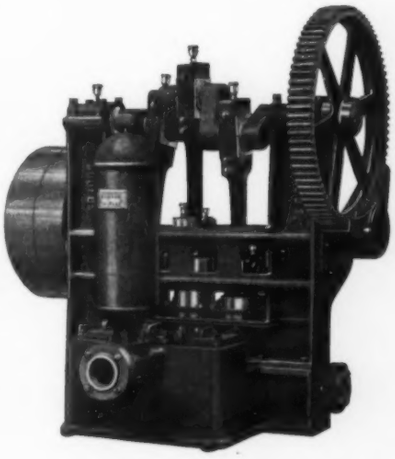


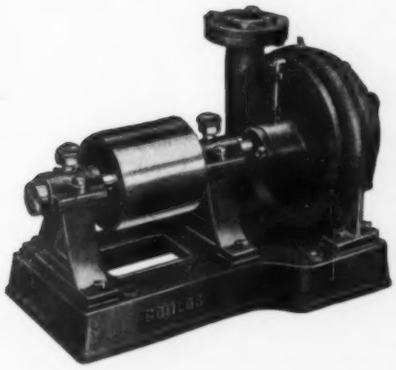


CENTRIFUGAL PUMPS: Single and multi-stage for oil circulating—main charging—spray and respray service—handling gasoline and light distillates—condenser service—boiler feed—brine circulation and many other applications. Specifications in Bulletins 105, 111, 118, 119, 125 and 129.



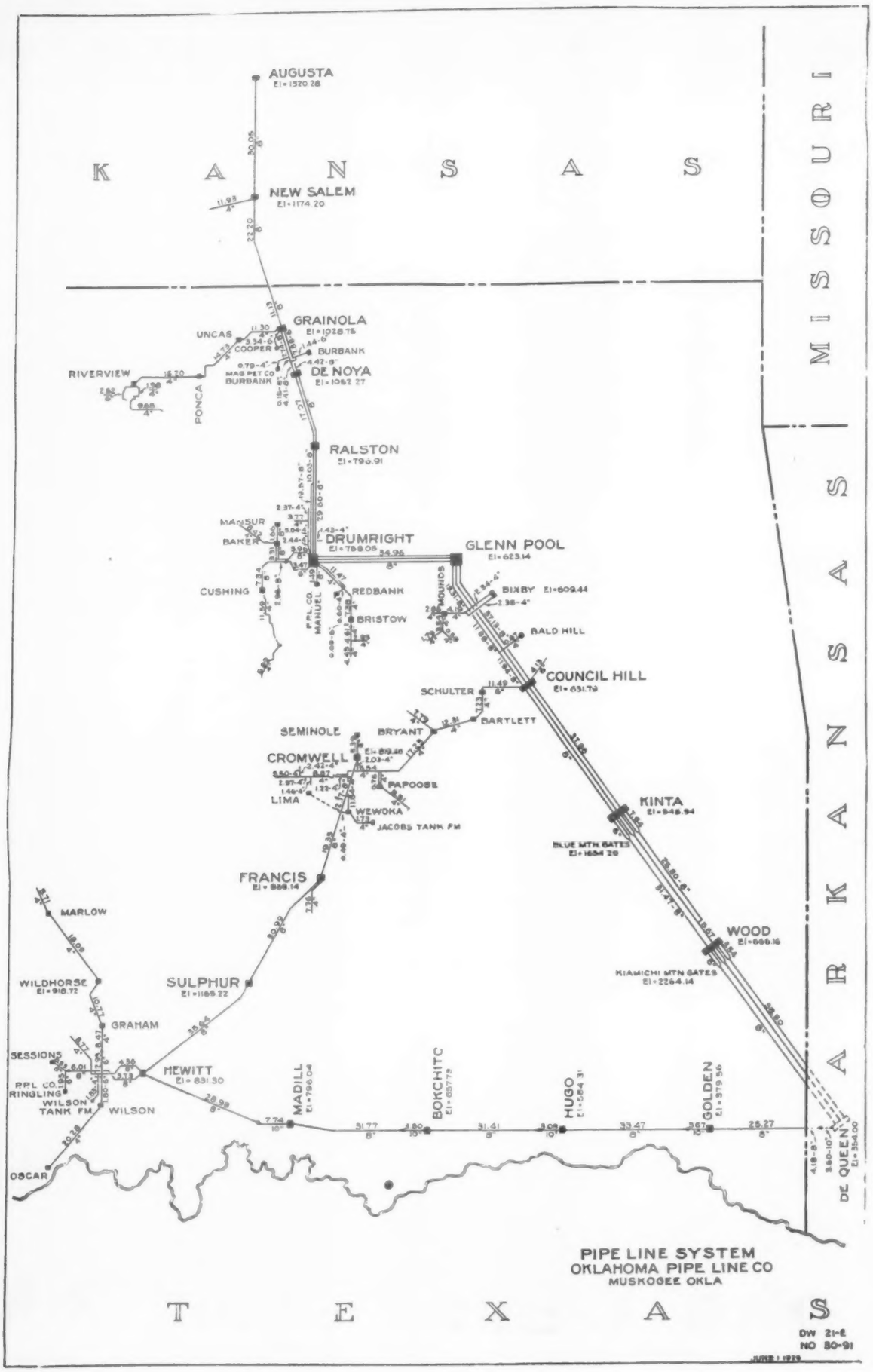
TRIPLEX PUMPS: For a great variety of uses such as: Gasoline and naphtha high and low pressure work—loading out—transfer service—handling ammonia—pumping wax—filter press service, etc. Specifications—Bulletins 100, 101, 103, 104, 107 and 116.





Seneca Falls, N. Y.

PUMPS


AUGUSTA
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NEW SALEM
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KANSAS
MISSOURI
ARKANSAS
GRAINOLA
El = 1028.75
UNCAS
COOPER
BURBANK
RIVERVIEW
MAG PET CO
BURBANK
DE NOYA
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PONCA
RALSTON
El = 796.91
MANSUR
BAKER
DRUMRIGHT
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GLENN POOL
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BALD HILL
COUNCIL HILL
El = 631.79
SCHULTER
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SEMINOLE
BRYANT
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PAPOOSE
LIMA
WEWOKA
JACOBS TANK FM
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El = 848.94
BLUE MTN GATES
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FRANCIS
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MARLOW
WOOD
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KIAMICHI MTN GATES
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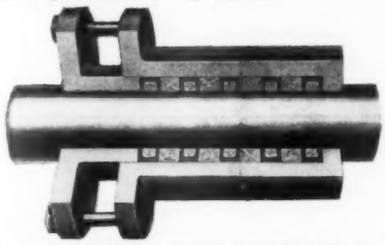
El = 918.72
SULPHUR
El = 1189.22
GRAHAM
SESSIONS
PPL CO.
RINGLING
WILSON
TANK FM
WILSON
HEWITT
El = 891.30
MADILL
El = 796.04
BORCHITC
El = 657.78
HUGO
El = 584.31
GOLDEN
El = 379.56
OSCAR
DE QUEEN
El = 354.00
PIPE LINE SYSTEM
OKLAHOMA PIPE LINE CO
MUSKOGEE OKLA
TEXAS
DW 21-E
NO 80-91

Pack Your Pumps

According to the Best Modern Engineering Principles

Pipe Line Station Pumps

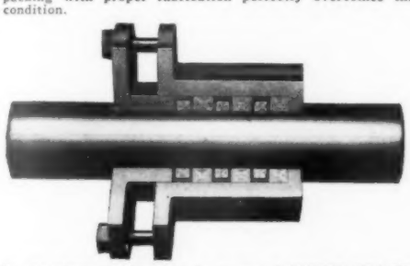
These plunger pumps usually handle crudes or distillates and operate 24 hours continuously. Plungers must run cool; they must not become scored. Friction must be reduced to an absolute minimum. Long packing life and uninterrupted service is very essential.



We strongly recommend "JOHN CRANE" Style 104, as shown in above cut. Style 104 is a combination of 101 all-metallic rings and 401 resilient semi-metallic rings. Some installations of this combination have been in service now over five years and plungers are still smooth and polished. An additional ring added occasionally is all that is necessary. No packing needs to be removed. Many Goulds, Worthington, National Transit, Prescott pumps have been packed with this combination.

Gas and Air Compressors

Gas and air compressor rods must run cool and continuously. A hot gas rod is a needless fire risk. Metallic packing with proper lubrication perfectly overcomes this condition.

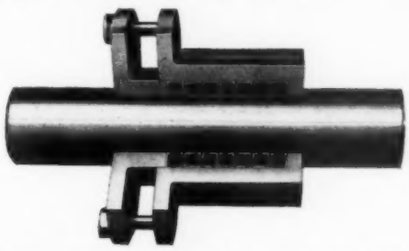


In the above stuffing box is a set of "JOHN CRANE" 104-E, which is a combination of 101 all-metallic and 301 resilient asbestos channel with metallic insert.

Many Bessemer, Cooper, Clark, Ingersoll-Rand compressors in the oil fields of Texas, Oklahoma and California have been so equipped. Some installations are over two years old, operating under the most difficult field conditions.

Centrifugal Gasoline Pumps

Centrifugal and rotary gasoline pumps handling gasoline present a most difficult packing problem. Gasoline washes away the entire lubricant on the face of the packing. Only a non-frictional babbitt packing is applicable if gasoline is to be handled against pressures. Sleeve cutting must be eliminated and cool running guaranteed.



A combination of rings of 110 is recommended. Style 110 is asbestos core with a babbitt foil armor, presenting a non-frictional face. Many Worthington, Goulds, Manistee, Dean and Kinney pumps have been so equipped in the oil fields of the Southwest. Some installations in refineries have been in operation over two years, handling gasoline at 300 pounds pressure. Packing still giving service and sleeves in perfect condition.

Hot Oil and Tar Pumps

High temperature and stickiness of this material to be pumped demands a super packing, against high pressures. Metallic face must be of copper foil and interior copper wires or asbestos.

This cut shows a set of 205, which is a combination of 501 rings, copper wires with a copper covered foil exterior at the bottom of the box, and the remainder of the set is 201, consisting of asbestos interior with a copper foil armor. Many Worthington, Burnham hot oil and tar pumps are being so equipped successfully.

High Temperature Valves

High temperature valve stems in refineries require the use of copper foil packings, in small sizes up to ½". These valves become red hot; hence packing must not burn out or give way under pressure.

Style 200 is a perfect high temperature packing, asbestos interior for resilience and copper foil armor for reducing friction between stem surface and packing, under great pressure. Many high temperature valves and still stirring rods have found this style a life-saver.

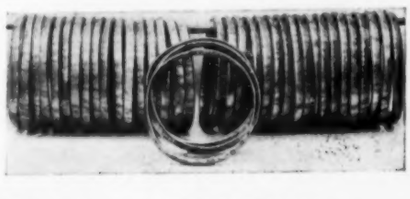
Coupling Gaskets—High Temperature Oil Lines

Gaskets usually used on Dresser or Dayton joints, when armored with metallic foils, such as babbitt, copper or aluminum, have their life extended many times, especially on high temperature lines where the heat is apt to vulcanize the asbestos gaskets to the pipe surface. Our copper or aluminum foil armor will prevent this vulcanizing or tearing when pipe moves; hence this newly developed armored gasket.

On gas, low temperature work, babbitt foil covered gaskets are recommended. On high temperature hot oil or heat exchanger work, copper or aluminum foil covered gaskets are recommended. A perfect armor is obtained by spirally wrapping narrow strips of foil over its entire body. Gasket is flexible, compressible and perfectly protected.

Specify "JOHN CRANE" armored coupling gaskets if permanency is desired.

Write us your location so we can have our field representative call on you. Correspondence on all or any of your packing problems cordially invited.



109 Broad St., New York

616 Mission St., San Francisco

Crane Packing Company

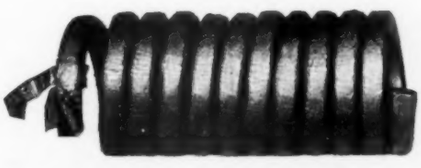
1819 Cuyler Ave., Chicago

CRANE PACKING CO., Ltd., Slough, Bucks, England

12228 St. Clair Ave., Cleveland

2419 Commerce St., Dallas

Style 100 (to left) is a flexible, compressible, uniform, all-metallic packing, consisting of spirally wrapped babbitt foil, impregnated with graphite between the layers.



Style 200 (coil above) asbestos core with copper foil strips spirally wound, forming a perfect metallic armor.

Style 500 (coil above) core of braided fine copper wires with armor of copper foil spirally wound, presenting a smooth metallic face.

Styles 300 and 400 (above) resilient semi-metallic packing with asbestos or duck channel, with metal insert of Style 100 stitched securely thereto. In coils or sets.

Style 110 (to right) has an asbestos core and is armored with spirally wrapped babbitt foil, layers impregnated with graphite.

"John Crane" Metallic Packing

Prominent Pipe Line Company Officials

W. L. MELLON
Chairman of Board, Gulf Pipe Line Co.

(c) Bachrach
R. V. HANRAHAN
President, Humble Pipe Line Co.

GEORGE S. DAVISON
President, Gulf Pipe Line Co.

F. A. LEOVY
Vice President, Gulf Pipe Line Co.

W. S. PILLOW
Vice President-Treasurer, Humble Pipe Line Co.

R. S. BURDICK
Secretary-Assistant Treasurer, Humble Pipe Line Co.

J. A. NEATH
General Supt., Humble Pipe Line Co.

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One of the 24 Heine M-Type Boilers used in Crusader Pipe Line Service. View shows Urbana, Arkansas — Station No. 1 of this pipe line.

Furnishing Power for Pipe Lines and Refineries

IN the petroleum industry Heine Boilers enjoy a reputation for reliability and efficiency that has been won under the most exacting conditions. Each year they generate the steam power which transports millions of gallons of crude oil from well to refinery and there converts the crude into finished products.

Recent High Lights Among Heine Activities in this Field Are:

In a single refinery Heine has installed about 8000 h. p. of MC-type boilers operating as waste heat boilers on hot gases from stills.

A large midwestern refinery has placed its third order for four 522 h. p. Long Drum HC-type boilers.

A Texas refinery has just completed the installation of three Heine V-type boilers to be fired with petroleum coke.

A diversified experience in this type of service enables Heine engineers to design boilers that will consistently give superior performance.

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HELIOS

Heine Boilers

Electrical Power for Pipeline Pumps

Humble Pipe Line Co. Has Obtained Satisfactory Results in Using Current at Stations in North Texas Area

By C. D. Lockwood

Electrical power for pumping oil both at the well and at pipeline stations is steadily but surely gaining in popularity in north Texas. More than 200 wells in northern Eastland and Stephens Counties are now being pumped by electrical equipment and the Humble Pipe Line Co. is completing the installation of a new set of pumps and motors at its Fleming pipeline station, near Pioneer, as well as other electrical installations on pumping wells in the Cross Cut area of Brown County.

In pipeline work, the electrical motor is considered advantageous in preference to the internal combustion engine by the Humble Pipe Line Co. where the cost of the current is low enough to make it economical. The whole thing, however, depends on the charge made by the power company supplying the current. The electrical motor, of course, is much less noisy than the Diesel engine or other power, and is much cleaner. Labor requirements are also less, thus cutting down the cost of overhead. One man can take care of the electrical motors and do other work about the station because he can leave them for several hours at a time without danger. They require only a fraction of the lub oil needed by a combustion engine and have other advantages.

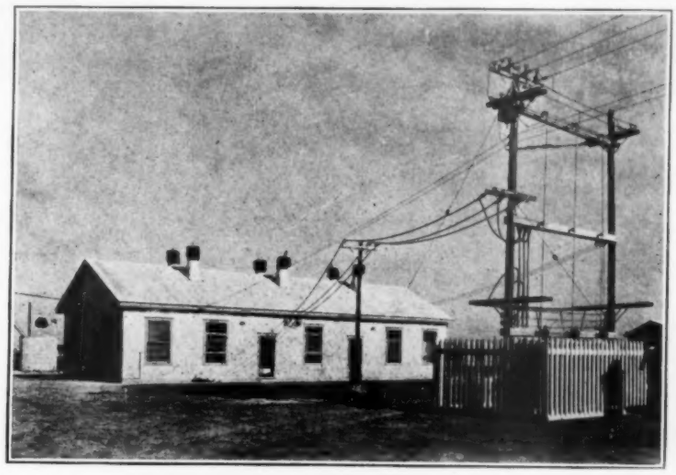
Power Rate Must Be Low

Unless the rate made by the power company is right, however, all of these savings in labor, oil and so forth can be eaten up in a hurry. These rates vary considerably, depending on the size of the station, capacity of the pumps, the speed at which they are run, the pressure on the line, and so forth, so that the question of economy has to be worked out in each particular case.

The Humble Pipe Line Co. has evidently found electrical power to be satisfactory in the Eastland-Brown County district of north Texas for it has been operating an electrically equipped station near Ranger since 1920. This is known as the Colony Creek station. For a time, this equipment was moved to the Chambers Creek station in the Powell Field but the power rates in that district proved prohibitive for this particular project and the equipment was returned to its original location.

Colony Creek Station

Last year the Colony Creek station was rebuilt and new equipment installed.



Colony Creek pump station of the Humble Pipe Line Co.

This consists of three 4½ by 12 National Transit plunger pumps driven by 75-horsepower General Electric motors, each of these pumps having a capacity of 4,800 bbls. a day, and three 4⅛ by 18 Deane pumps driven by 100-horsepower Westinghouse motors. Each of these pumps has a capacity of 7,000 bbls. daily, giving the station a capacity of about 35,000 bbls. daily, at 700 pounds pressure. The line from Colony Creek to Comyn, on the main line, is 37.5 miles in length and is 8 inches in diameter. During a recent month when approximately 650,000 bbls. of crude were pumped through this station the cost per barrel was .49 cents, of which the electrical power amounted to about $2,100, or in the neighborhood of .32 cents per barrel. This is not cited as the average cost of pumping oil at this station but as the figure for one particular month. Repairs and various other miscellaneous costs were included in the total, as they were in the totals for other stations using combustion engines, and in this month the Colony Creek station's cost per barrel compared very favorably with all of the other stations in this district. The cost of electricity at Colony Creek varies from about $1,600 to as high as $3,000 monthly, depending on the amount of crude pumped through the line, and other factors.

The reconstructed Fleming station, near Pioneer, has one 4½ by 12 National Transit plunger pump driven by a 75-horsepower General Electric motor and one 4⅛ by 18 Deane pump driven by a 100-horsepower General Electric motor. The line from Fleming to Peak is 37 miles long and consists of two 4-inch lines for 6 miles, the balance being a 6-inch line. This station will operate at 450 to 500 pounds pressure and will have a capacity of about 10,000 bbls. daily, according to estimates, although no tests have been made as yet.

Variable Speed Transmission

An interesting piece of equipment at this Fleming station is the Reeves Variable Speed Transmission, by means of which the speed of the suction pump can be increased or decreased at will without altering the speed of the motor. This is the first machine of this kind that the Humble has tried out and it has been found satisfactory at this station. This variable speed transmission eliminates the necessity for a variable speed motor and other accompanying equipment which is an important advantage and a big saving. In the Fleming station it is located between a 50-horsepower General Electric motor and a 7 by 10 Gaso suction pump.

The Humble Pipe Line Co. has three small temporary field stations in the Cross Cut, Cross Plains area operated by electricity and all are giving satisfactory service. The power is supplied by the West Texas Utilities Corp., in this district, while at the Colony Creek station, near Ranger, the Oil Belt Power Co. of Eastland, supplies the "juice." In all cases, the power companies construct the lines to the station or to the well, the pipeline company or oil company being put to no expense in this respect, but paying a flat rate for the electricity used.

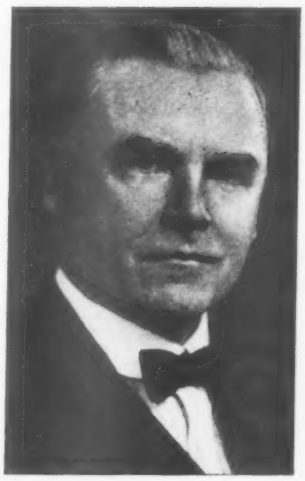
In the final analysis, the type of power used for pumping in any case, is the type which lowers the cost per barrel, regardless of which is the cleanest or most convenient to handle or the easiest on the ears. Beyond question, electricity has decided advantages in these latter respects and in many cases is more economical than the combustion engine. However, that is a question which depends entirely on local specific conditions and cannot be answered broadly.

Interior view of the Colony Creek pump station of the Humble Pipe Line Co.

Prominent Pipe Line Company Officials

C. H. KOUNTZ
Vice President, Prairie Pipe Line Co.

W. F. GATES
President and General Manager, Prairie Pipe Line Co.



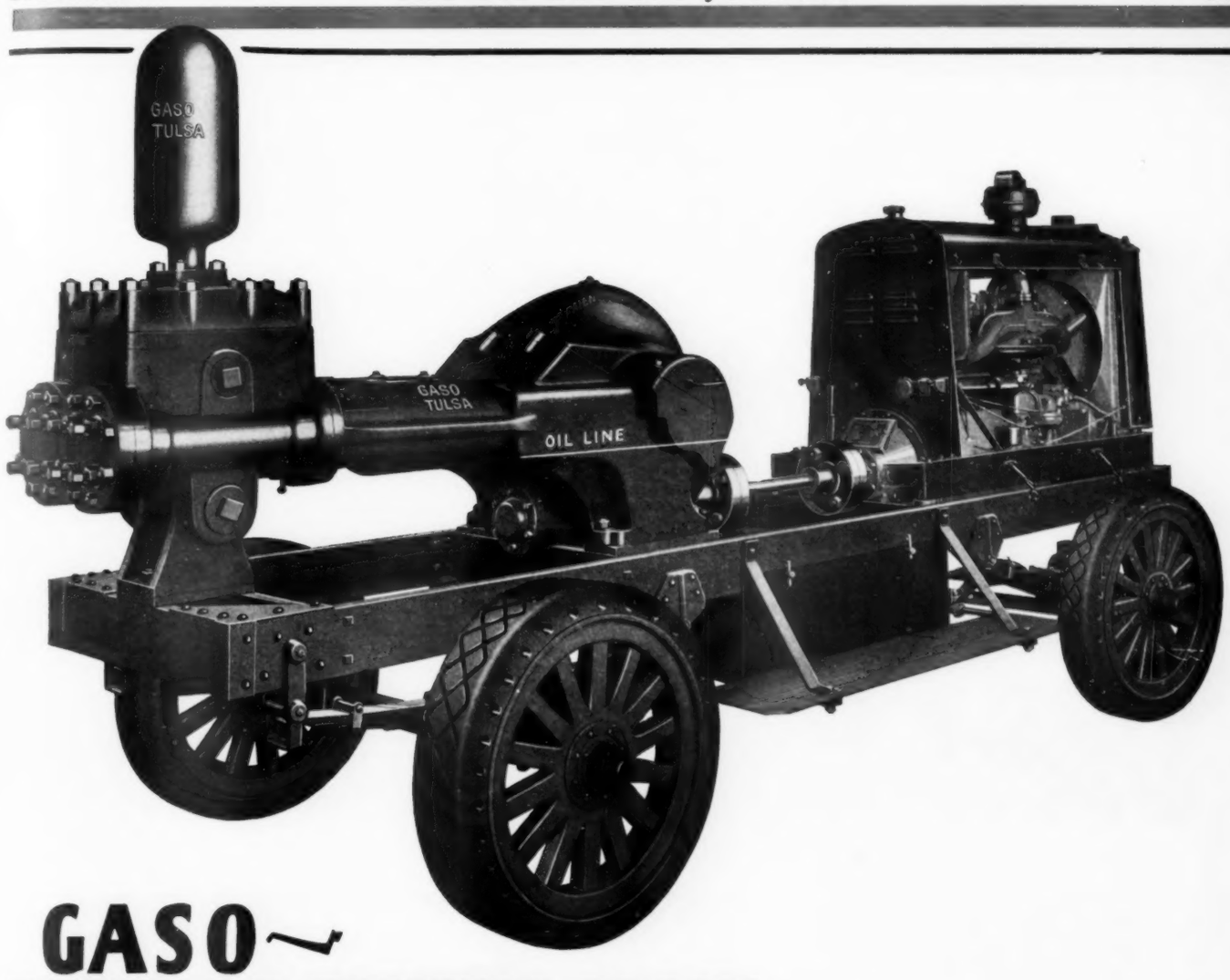
GEORGE COYLE
General Superintendent, Sinclair Pipe Line Co.

F. M. WILHELM
Secretary, Prairie Pipe Line Co.

R. G. HARE
Treasurer, Prairie Pipe Line Co.

H. D. McCRACKEN
Vice President and General Manager, United Pipe Line Co.

M. E. FANNON
Prairie Pipe Line Co.



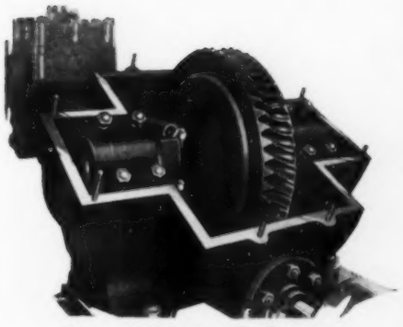
GASO PORTABLE PUMPING PLANT

Ideal as a Temporary Pipe Line Pumping Station

The GASO Portable Pumping Plant with our new self-lubricating worm drive pump, was introduced last fall to answer a demand on the part of the pipe line companies for a "pick-up" unit. Its success has been pronounced. It has proved ideal for "pick-ups" in case of pipe line breaks, for all temporary or semi-permanent pump station and booster service, for water supply in drilling operations, etc.

Pump is duplex, double acting, enclosed, interchangeable liner type, with capacity up to 250 bbls. per hour at low pressures. Power unit is 50 H.P. Buda 4-cylinder motor. Ask us for further particulars.

GASO PUMP & BURNER MFG. COMPANY
Tulsa, Oklahoma



View of power end of pump with cover removed, showing bronze worm gear running in oil bath.

GASO PUMPS
for every oil industry need

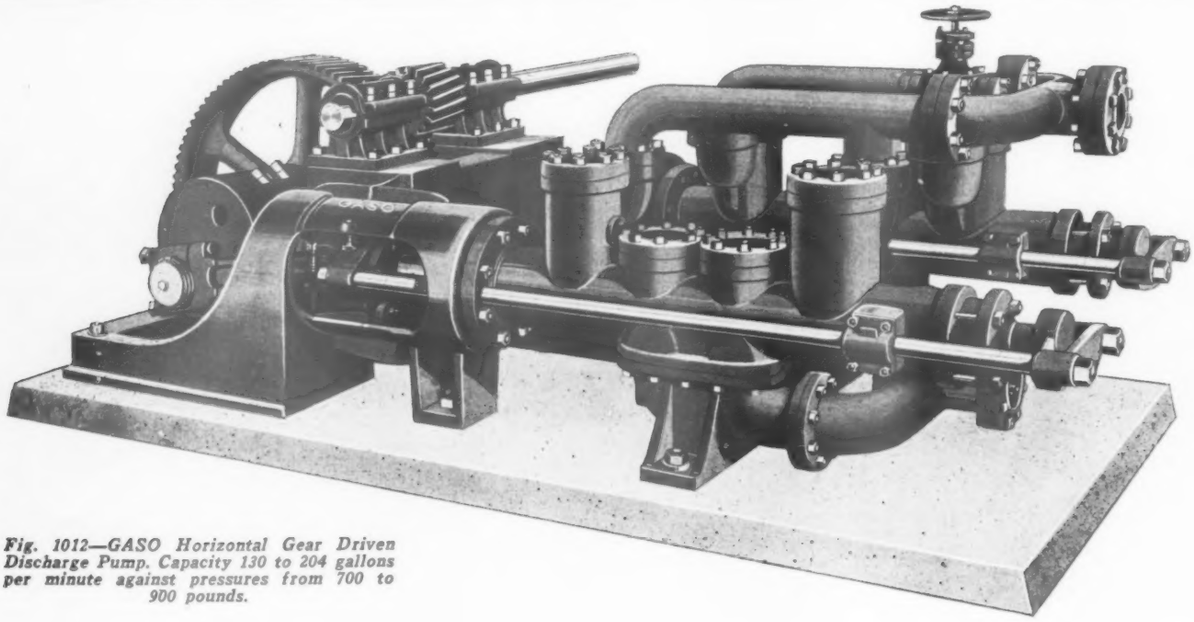


Fig. 1012—GASO Horizontal Gear Driven Discharge Pump. Capacity 130 to 204 gallons per minute against pressures from 700 to 900 pounds.

Used by the Leading

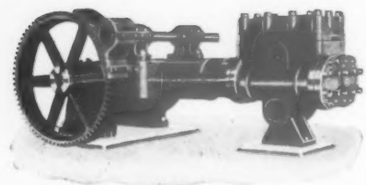


Fig. 508—GASO Duplex Piston Gear-Driven Power Pump. Interchangeable Liner Type.

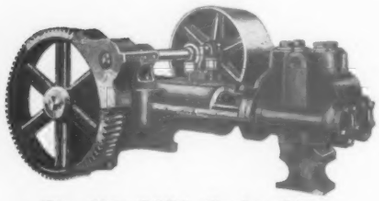


Fig. 504—GASO Duplex Piston Gear-Driven Power Pump. Valve Pot Type.

Built Exclusively For One Industry

GASO Pumps have been in wide use by the leading pipe line companies for many years. We are proud to number among our best customers such companies as Prairie Pipe Line Company, Sinclair Pipe Line Company, Texas Pipe Line Company, Oklahoma Pipe Line Company, Cosden Pipe Line Company, Gulf Pipe Line Company, Magnolia Pipe Line Company, Midwest Refining Company, Humble Pipe Line Company, and many others.

The success of GASO Pumps in the Oil Industry is directly traceable to our policies of building pumps exclusively for one industry and designing them to withstand the extra-severe service conditions prevailing in that industry. All GASO Pumps are characterized by few, strong parts. GASO Service is prompt and painstaking.

GASO PUMP & BURNER
TULSA,

GASO PUMPS
for every oil industry need

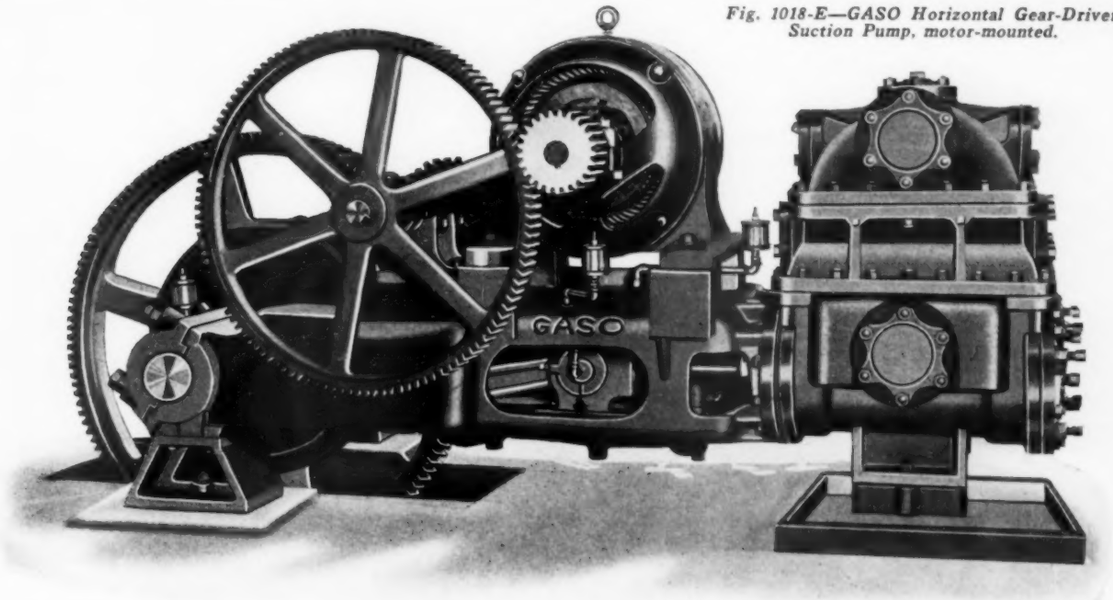


Fig. 1018-E—GASO Horizontal Gear-Driven Suction Pump, motor-mounted.

Pipe Line Companies

Motor Drive For Oil Industry Pumps

Use of electric power in the Oil Industry is fast becoming the rule instead of the exception. GASO was among the pioneers in offering motor-driven and motor-mounted pumps to the Industry.

Practically any pump in the extensive GASO line, with the exception of the small pumps designed for connection to rod lines, walking beams, etc., may now be had in electrified type.

The above illustration shows our large Duplex Piston Gear-Driven Suction Pump direct-geared to electric motor mounted on frame. This pump is in wide use for pipe line station service. Ask us for full particulars on GASO Motor-Driven models.

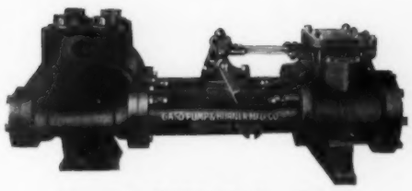


Fig. 407—GASO Duplex Piston Heavy Duty Steam Pump. Capacity up to 212 Barrels per hour.

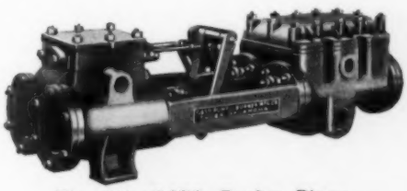


Fig. 401—GASO Duplex Piston Steam Pump—Standard Type.

MANUFACTURING CO.
OKLA.

GASO PUMPS
for every oil industry need

WALKING BEAM AND ROD-LINE PUMPS

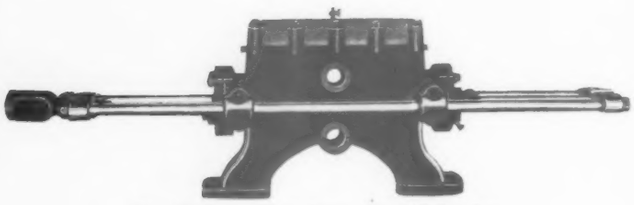


Fig. 301—Gaso Piston Power Pump (Jerker Pattern). Capacities up to 157 barrels per hour.

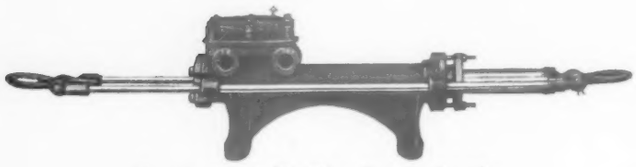


Fig. 201—Gaso Rodline Pump, for general service. One size only. Capacity, at 24 strokes per minute, 41.28 barrels per hour.

Fig. 601—Gaso Walking Beam Pump, for Oil or Water. For 450 to 600 pounds pressure. Capacities up to 55 barrels per hour.

Fig. 604 — Gaso Walking Beam Pump, for Gas or Vacuum. Used for taking gas from the pumping well or to put vacuum on the well.

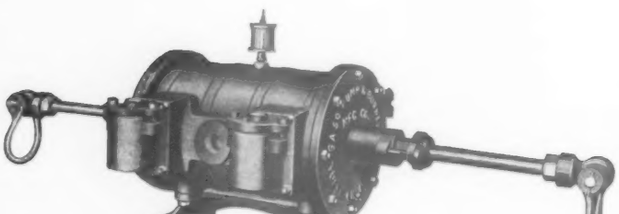


Fig. 604½—Gaso Power Pump, for Gas or Vacuum

The Gaso Pumps illustrated on this page have enjoyed a wide sale throughout the Oil Industry for many years, as they make pumping service available at any point where a walking beam or rod-line is in constant operation.

Pumps of this type are installed and operated with a minimum of expense and trouble.

Design is simple and rugged. The well-known Gaso principle of few, strong parts has been employed. Cylinders are made of the very best grade of gray iron castings accurately bored. Walking beam types have extra long stroke in order that they may be set far enough out on the main sill to clear the Samson post brace. This gives a straight-line pull, reducing wear on the packing and stuffing box.

GASO Jerker Pumps (Fig. 301) have been used by the large pipe line companies for the past ten years and have proved altogether successful as high duty pumps. They are constructed to withstand the high pressures of main pipe lines, which usually exceed 600 pounds per square inch, but are also suitable for lease or any other low-pressure work around refineries or pumping stations.

For full particulars address

GASO PUMP & BURNER MFG. COMPANY

Tulsa, Okla.

GASO PUMPS

for every oil industry need

Prairie Aided Mid-Continent Growth

Extension of Its Lines as Fields Developed Provided Market Facilities With Outlets to Gulf and East

By J. L. Dwyer

The history, growth and development of the Mid-Cointinent oil field is synonymous with the history, growth and development of the Prairie pipeline system, and the unbiased historian must record that this system is interminably mingled with the expansion of the fields.

The first crude oil pipeline in Kansas was built by the Prairie, and in Oklahoma the Prairie also pioneered in pipeline construction. Prior to the building of these lines, the total absence of a marketing system was one of the greatest obstacles in the path of the industry's progress, at least, as far as the western fields were concerned. It has been said that the presence of oil and gas in Kansas and Oklahoma was known before any market was established, and that the lack of facilities hampered and delayed the mineral exploration.

Operated in its earlier stages by the Prairie Oil & Gas Co., the pipeline system was taken over by the Prairie Pipe Line Co. when that concern was organized in 1915. Since 1903, at which time it really started operations in Kansas, until the present time, the Prairie system has been the chief outlet for the millions of barrels of oil which have been produced in Kansas and Oklahoma, and more recently in Texas, it has transported its share of the crude.

From a modest beginning, the Prairie system is now composed of 11,200 miles of oil pipelines, and is the largest pipeline system in the world. Starting in Kansas after the completion of the Standard Oil Co. of Kansas' refinery at Neodesha, the first gathering line of the system was built to Chanute in 1904, when that field was at its height.

Progress of Company

The successive steps in the progress of the company may be mentioned as follows:

1. Its first pipelines.
2. Its entry into Oklahoma.
3. The construction of what was called the Chicago line, running from Humboldt to Sugar Creek, Mo.
4. The first south outlet made when the Arkansas lines were built.
5. The first Prairie lines built into Texas.
6. Its entry into the Wichita Falls district of Texas.
7. Its first Gulf Coast outlet obtained when controlling interest in the Pure pipeline system was purchased.
8. The line to the Texas Panhandle which is now under construction, and which is expected to exert a very important influence upon that field.

In reviewing some of the early incidents in the Kansas fields, it is interesting to note that as early as 1904, the Prairie Oil & Gas Co. was issuing warnings to the oil producers regarding the problem of overproduction. Those who are familiar with the history of recent years, will recall that a similiar warning has been sounded from time to time when production of new fields deluged the crude market.

Congress Has to Act

After the completion of the pipeline from Neodesha to Chanute, Kans., pipe was strung by the Prairie through the northern part of Oklahoma preparatory to the construction of a line to serve the Bartlesville and adjacent fields. Consternation was caused by an announcement of the Secretary of the Interior that before pipe could be laid through Indian country, a special act of Congress would be necessary. The pipe which had been strung was picked up, and stored. The Prairie company made application to the Secretary of the Interior for permission to lay a pipeline from the Bartlesville Field in Oklahoma, to Caney, Kan., on the line between the two states. The matter was presented to Congress, and in 1904, by a special act of Congress, the Secretary of the Interior was authorized to permit the Prairie company to build the line. Previous to this time, the oil purchased by the Prairie in the Bartlesville Field was shipped by tank car over the Santa Fe Railroad to Caney, a distance of approximately 20 miles. This short haul had been very expensive, and by the building of the line, a great improvement in economic conditions for the Oklahoma field was effected.

In December 1904, "the Bartlesville 6-inch" was placed in service, the first trunk pipeline of the state. During this winter, lateral lines were laid to the Chelsea Pool, which had been opened, and the extension program of the Prairie was started in Oklahoma.

First Line to East

It was during 1904, that the famous Chicago line was built. This line was constructed from Chanute, Kans. to Olean, N. Y., but the Prairie Oil & Gas Co. built the section from Chanute to Sugar Creek, Mo. This was one of the most beneficial steps taken in the interest of the Mid-Continent Field, and its completion furnished a new outlet for the crude which had previously been limited in market by the heavy cost of rail transportation. It marked an epoch in the history of the field, and gave a great stimulus to development work. Through this line, Mid-Continent oil now found its way to the eastern refining centers, and new channels of commerce were formed through the functioning of this artery. Oil from Kansas and Oklahoma now found a market in competition with oil from Ohio, Indiana and Illinois, and even to some extent with the Pennsylvania product.

Each successive year since that time has found the Prairie system expanding with the increasing borders of the fields. In 1906, the first spread of activity in Kansas production occurred, and during that year the Prairie built lines into various sections of Mongomery, Wilson, Allen and Chautauqua Counties, During this year, the discovery of oil in the southern parts of Osage County, caused extensions of the Osage lines.

Opening of Glen Pool

In 1907, the famous Glen Pool in Creek and Tulsa Counties of Oklahoma, was opened to the world, and the Prairie lines were pushed forward once more in response to the required transportation facilities.

At this time there were three major purchasers of oil in this area, the Prairie, The Texas Company, and the Gulf Pipe Line Co. During the preceding year the Osage lines of the Prairie had been extended to the south by discovery of production, and in 1907, the Cleveland Pool on the borders of Pawnee and Osage Counties was found. The pipelines followed the drill, and Cleveland took its place in the list of Prairie pipeline stations.

In the older sections of the state, farther north than Glen Pool and Cleveland, the Nowata Oil Field was discovered during this year (1907), and extensions of the Bartlesville system of lines were necessary to handle the oil from the newer regions.

The finding of oil at Morris, Okla. during the year 1908, necessitated a 50-mile jump in pipeline construction for the Prairie, and when the Morris Field assumed proper proportions, and good production was assured, the lines were built from Glen Pool to Morris in Okmulgee County. The Morris Pool was the only unusual development of the year.

Development Near Tulsa

In 1909, a bevy of fields obtained prominence simultaneously, and pipeline facilities were naturally in demand. The Red Fork and Taneha Pools along the present highway between Sapulpa and Tulsa, in Creek and Tulsa Counties, were discovered, and to the south, oil was found at Hamilton Switch. The name of this town has since been changed to Preston, and at the time of discovery, the field was believed to have an influence upon the crude market, although it was not in the market breaking class. A sporadoic drilling campaign, conducted in the region intervening between Preston and Morris, resulted in the discovery of several small pools, and as these were close to the lines of the Prairie, no long extensions were necessary.

In addition to furnishing several extensions, the year 1910 marked an epoch in the Prairie history, for it was during this year that the first southern oil outlet was made by that concern. During the drilling of the Okmulgee, Morris and Preston fields, the Oklahoma Pipe Line Co. connected to many wells, and obtained a good share of the production. Oil originating on the Oklahoma pipeline was transported to DeQueen, Ark. the terminal of the Oklahoma system. Realizing the need of facilities, and the importance of having southern connections for crude, the Prairie constructed a pipeline across the State of Arkansas, reaching from DeQueen, to Ida, a town on the Louisiana-Arkansas border at which point the crude was delivered into the lines of the Standard Oil Co. of Louisiana. By connecting with the Louisiana company's lines, an additional market for Oklahoma crude was made possible through the large refinery of the Standard Oil Co. of Louisiana at Baton Rouge. The Arkansas pipelines of the Prairie were later sold to the Standard Pipe Line Co. of Louisiana when that concern was brought into being.

Muskogee and Wagoner

It was in 1910 that the Muskogee and Wagoner territories of Oklahoma were found productive, and the ever-growing line which up to then terminated at Morris, Okla., was extended to those points. The production of the Muskogee and Wagoner County Pools was never sensational, but was profitable, owing to the shallow depths at which the oil was found. They contribute their chapter to the history of the Prairie Lines.

All industries experience periods of the famous "calm before a storm," and the years 1911 and 1912 bore that significance to the oil fields. The Cushing Field, discovered in 1913, was most emphatically the storm, and it broke in all its fury in 1914. It must be mentioned in passing that this year marked another epoch for the Prairie company, although not in the matter of expansion. It was in 1914 that the first panic hit the Mid-Continent Field. The cause of the disturbance was overproduction, and a great amount of clamor and agitation resulted from the decreased price of oil. After several clashes with Oklahoma officials, the Prairie clearly demonstrated the right of a pipeline to refuse to accept oil which will burden it, or tax its marketing facilities. The matter might be classified as one of the great economic adjustments of the petroleum industry. From the chaos caused by the drilling of the Cushing Field, there was another incident which bore some relation to pipeline companies, that was the erection by producers of large steel storage tanks. Previous to this time, the only large tanks, (55,000 bbls.) had been owned by the pipelines. When the leases in the Cushing Field became clogged with oil which the pipeline companies refused to accept, the advisability of having some reserve storage became apparent to the producers This practice has not been followed generally, but in fields which have huge production, a battery of 55's, owned by producers, is not an uncommon sight.

During the years 1914 and 1916, the activities of the Prairie lines were confined to handling the oil from the old fields, as no new fields of importance appeared during that time.

The Kansas fields held the spotlight during 1917 when the Augusta and El-

(Cantinued on Page C-184)

YEARLING BUTTED PIPELINERS; OWNER LOST TEMPER, AND COMPANY WAS ASSESSED $25

Speaking of the simple little word BUT, Mr. Webster says: "But—conjunction—meaning notwithstanding the fact that." So far as he goes, hats are off to Mr. Webster, but in his day he was not familiar with the BUTT of the pipeline claim agent. It happened like this: Some time ago one of the claim agents of the Blank Pipe Line Co. was going over a section of land where a new line had been laid. He had surveyed the damages and approached a lady whose land had been torn up by the ditch.

After introductions and preliminaries, the claim agent's trained eye perceived that all was not well in Denmark as far as the interest of his company was concerned.

"Now, madam, I think that a sum of $25 will cover the damage we have done to your land, and if you will sign this receipt I will pay you immediately," said the agent.

"Well," said the lady, "that much money is certainly enough for the little damage youall did to my land, but that's not all you have to pay me for; youall must pay me $25 for the loss of my temper."

Quite at a loss as to how to proceed, the agent finally asked the lady to relate her own story.

"You see," said the lady, "it's thisaway. When your line was built through here I lost my temper aplenty of times, and you ought to pay me for it."

"But surely, madam, you cannot blame this company for the loss of your temper," countered the agent.

"Yaas, I kin," replied his antagonist. "Look yonder, do youall see that bull yearling? Well, he's been my pet since his mother died. I feed him myself, and take care of him, and its on his account that I lost my temper. You see when your men was abuilding this here line, that bull yearling watched them awful close, and every time he'd cacth one of them leaning over to pick up a shovelfull of dirt he'd get playful and butt him and knock the man into the ditch, and I was so afraid one of the men would hit that bull yearling with the shovel and kill him that I stayed mad all the time your men was working round here."

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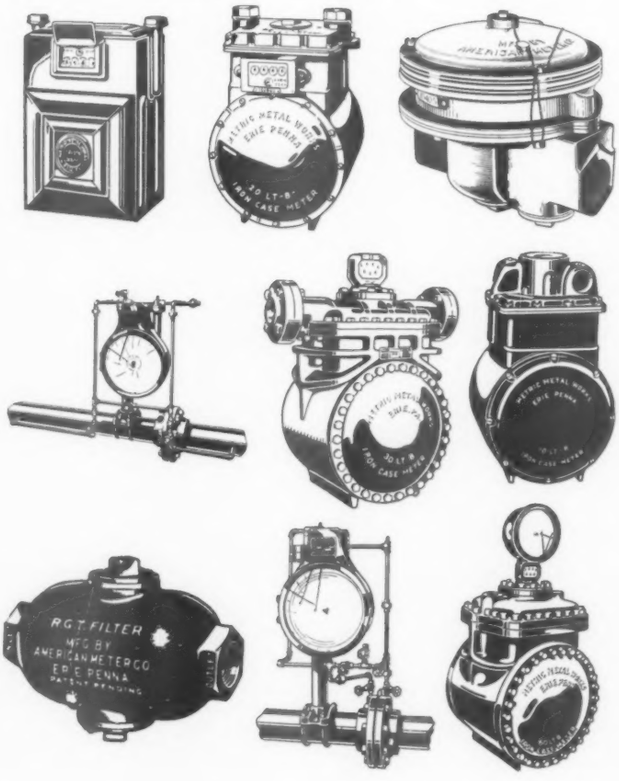

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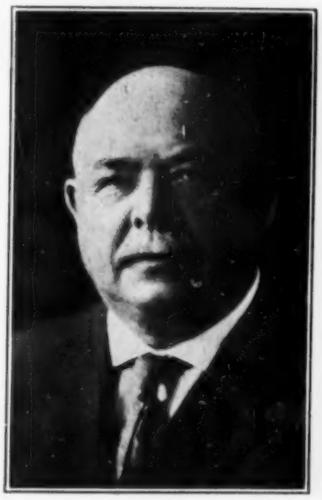

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A. M. DONOGHUE
Vice President, The Texas Pipe Line Co.

F. RAY McGREW
President, Standard Pipe Line Co. of Louisiana

L. T. AUSTERMELL
Secretary-Treasurer, Standard Pipe Line Co. of Louisiana

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General Superintendent, The Texas Pipe Line Co. of Oklahoma

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Announcing — a back

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New W-K-M Pipe Line Equipment includes a "BULLDOZER" that fills 30 feet of 24 x 36 ditch a minute; a "SIDE WINCH" which, with a 6-foot mormon board, fills a mile of 24″x36″ ditch a day; a "BOOM" that lays 3½ miles of 16″ pipe a day. Winch develops 12,000 pound pull on single line—unequalled for pulling river, creek, road, railroad and other crossings, loading and unloading pipe, and for many other kinds of pipe line work.

The W-K-M BULLDOZER

Manufactured under Cummings Patents and Patents Applied For

You can fill 30 feet of 24″x36″ ditch a minute with the W-K-M BULLDOZER—and do a clean, perfect job of every foot. Smaller or larger ditch can be filled proportionately fast.

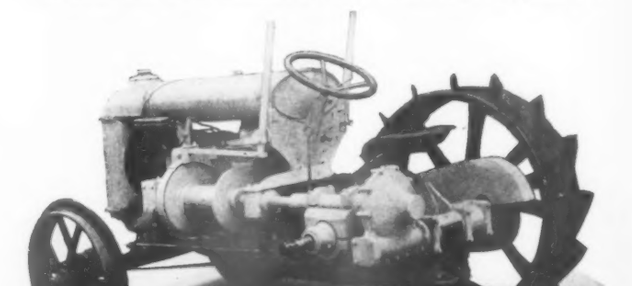
Your cost of operation will average $11.50 a day—including tractor driver's salary, gas and oil, and depreciation. When used in connection with the W-K-M SIDE WINCH and a six-foot mormon board, you can fill any ditch anywhere, in record time and even under the worst conditions.

In operation, the W-K-M Bulldozer is forced into the dirt by the weight of the tractor. It cannot ride over the dirt. Mold-board may be raised or lowered from the driver's seat. Machine is very sturdily constructed, and will wear for years under the hardest service. Nothing else like it.

Send for full information

The W-K-M SIDE WINCH

Manufactured under Cummings Patents and Patents Applied For



Using a 6-foot mormon board, you can fill a mile of 24″x36″ ditch a day with the W-K-M SIDE WINCH. With this machine you can fill ditch economically that would be impractical to handle with any other equipment. In test and development work, more than 1500 miles of open ditch have been filled with the W-K-M BULLDOZER and SIDE WINCH on some of the country's most famous pipe lines, at all seasons of the year. Even frozen dirt was moved.

For pulling river, creek, railroad and other crossings, the W-K-M SIDE WINCH has proved itself without an equal. It will pull 8 joints of 16″ welded pipe on one line.

Loading or unloading pipe or anything heavy on wagons or trucks is one of many other uses for this wonderfully handy winch on pipe line work.

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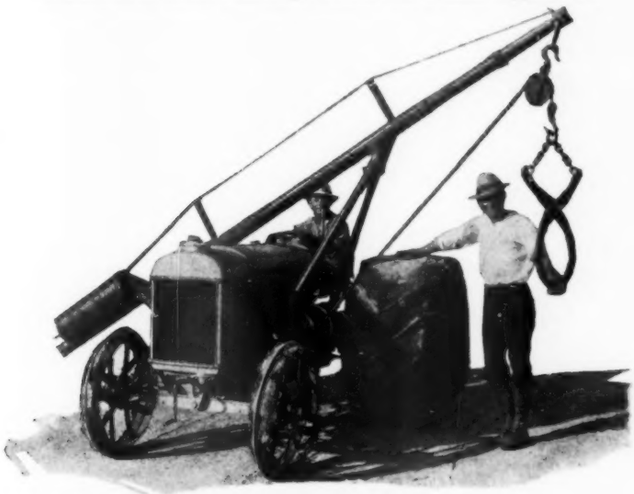
Sold by Authorized Fordson Dealers Everywhere

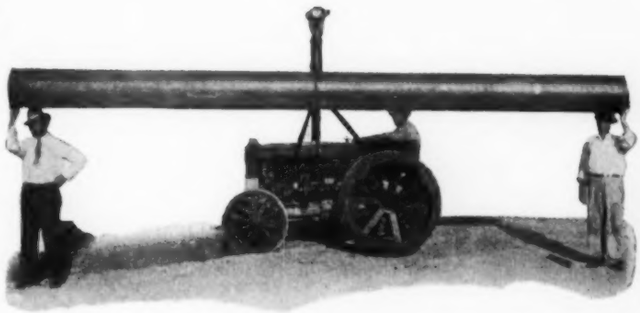
filling machine that will fill ditch under *pushes* or *pulls* the dirt as necessity dictates

The W-K-M BOOM

Manufactured under Cummings Patents and Patents Applied For



Mr. Burgess, pipe foreman for the E. A. McPherson Company, shown with a new W-K-M SIDE WINCH and BOOM outfit.



The W-K-M BOOM easily raises, and carries, 1800 pounds of deadweight. It will pick up a joint of either 16-inch or 18-inch pipe and carry it anywhere a tractor can go. The picture above shows a joint of 16-inch pipe raised over the heads of J. D. Cummings, inventor, and Geo. K. Dennison, inspector for the Houston Pipe Line Company. With a brace under the BOOM, this outfit will raise five or six joints of 16-inch pipe. The power, capacity, adaptability and convenience of this outfit makes it indispensable on any pipe line job. Write today for illustrated descriptive matter, using the coupon below or your letterhead.

Here, at last, is a Boom designed especially for pipe line laying

that does the work. Without any particular effort, it will lay 3½ miles of 16″ pipe across the ditch in a day—at an average cost of $6.15 a mile *for all operating expenses*. Three men—a tractor driver, a hook man and a stabber do the work alone. This record has never been equalled by any machine built for this work. Wonderful for loading pipe.

The Sunday, August 8, issue of The Wichita Daily Times carried a special dispatch covering a world's pipe laying record established by C. J. Manaugh, field supt. Hope Engineering Co., now laying a 12-inch line near Vernon, Texas. Mr. Manaugh's record was 1160 joints of 12″ pipe a day.

"Jim" Manaugh, field superintendent for the Hope Engineering Company, who is credited with the world's pipe laying record using W-K-M equipment.

Two weeks later, in a demonstration to visitors and moving picture men, Mr. Manaugh speeded up his crew and laid 12″ pipe at the rate of 6 joints a minute. He used three men and one FORDSON tractor equipped with a W-K-M SIDE WINCH and BOOM.

The new W-K-M Fordson equipment for pipe line work represents the greatest forward advance in pipe line laying methods introduced in years. All three pieces of equipment have been tested and proved over a long period of months.

The W-K-M Company is now ready to demonstrate the enormous savings possible through use of this equipment, and invites inquiries.

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Measuring Tanks to Learn Capacity

The Tank Gauging Engineer and His Assistant, the Tank Strapper, Have an Important Part in the Functions of a Pipeline

By James McIntyre

The universal system of measuring oil tanks so that it may be known just what one contains at any specified height from floor to top, grew out of desire of a young New York Tribune proof reader to take a vacation in the Pennsylvania oil regions back in 1864.

The proof reader had been poring over a very dramatic story of Western Pennsylvania's new oil region, written by a star man for the Tribune, and he was fired with the desire to go west on his two week's holiday and take a spectator's part in the "oil boom." So James Robinson, accompanied by his brother Will, left New York and landed in the middle of the big excitement in Venango County. Will Robinson had a good head for figures and was a very practical man of an inventive turn of mind. James, too had never muffed any problems in mathematics, and the pair of young Easterners (born in Ireland, by the way) noticed soon after they arrived in the oil country that a very primitive and unsatisfactory method was in use in computing the quantity of oil held in the containers then in use in the field, and at the small refineries thereabouts.

The Robinsons became interested. They saw at once that a correct system of gauging the quantity of oil in tanks satisfactory to both the producer and the oil buyer was badly needed in the young industry, and that the men who could work out a proper system need not worry about their income for the remainder of their lives.

So they went at the problem. They must find a way to tell how much fluid a tank of any size or shape would hold from the first quarter of an inch above the bottom, upwards to the top of the tank.

First Tank Strapping

The brothers took the outside circumference of tanks at various heights, measured the thickness of the wooden staves, and then reduced their figures commensurately to find the interior circumference. They accounted for the amount of displacement of inside tank timbers, supports and ladders and then sat down to work out their problem mathematically. When they got their first tank measured by quarter-inch stages they showed the result to the heads of the companies which were purchasing oil and convinced them of the accuracy of the figures by a series of tests. Thereupon the system was adopted as something that filled a long felt want.

James Robinson never went back to proof reading. His brother, an electrical engineer returned to Boston, but James remained in Petroleum Center and was kept busy organizing and expanding the system of tank gauging.

In the course of time Mr. Robinson was placed at the head of the Standard Oil Co's tank gauging department with headquarters in the National Transit Pipe Line building in Bradford. He taught the business to his sons William F., Harry B., Frank, Clarke, Foster, and James B. all of whom have headed similar departments in the more westerly fields as the oil business expanded. The eldest son William is dead. Harry is tank gauging engineer for the Buckeye Pipe Line Co., at Lima, Ohio. Frank has a similar position with the Illinois Pipe Line at Findlay. Foster went into another profession. James B. and Clarke Robinson are independent tank gauging engineers in Tulsa.

Following Mr. Robinson's system came that worked out by James D. Macintyre of Titusville, Pa., who had headquarters for years in Bradford where he made tank tables for the Tide Water Pipe Co., and other pipelines.

No Secret About It

The oil business expanded so widely that it became necessary for some of the larger companies to work out their own system of tank measurements, and now many of them have tank gauging engineering departments which grew out of the original Robinson method of computing tanks. There is no patent or copyright on the work and nothing secret about it. Given the figures supplied by a good tank strapper the rest is simply a question of mathematics. However it is a line of activity that few engineers have gone into. For many years it was left for the Robinsons to do until the oil business became too great for the family to cover.

Engineers who have by long service with the pipeline companies learned the ins and outs of the business are now successfully conducting independent engineering departments of their own, but considering the hundreds of thousands of tanks scattered about the United States, the number of tank gauging engineers is comparatively few. However, we would not advise any young man to go into competition with the present day engineers without a complete training because he might starve in the length of time it would take him to measure the capacity of a 250-bbl. tank. The experts now in the business who have learned it from the ground up could compute a hundred tables while the newcomer was cudgeling his brains over his first one.

Enter the Adding Machine

While most of the tank tables yet in use are neatly written in pen and ink the newer method of making them is by the use of a specially equipped adding machine. The engineer presents the copyist with a set of key figures from which the tank tables are rapidly run up either by an expert pen and ink copyist or by an attendant operating an adding machine, which runs on electric power and prints the forms very rapidly and with absolute accuracy. If the operator is careful to follow the master figures. All tables are carefully checked before being sent out. It is said that few tables come back to the engineers with proof that they are incorrect.

The Strapper's Duties

The preliminary work of measuring a tank is done by a workman known as a tank strapper. He is employed always by the pipeline company and it is his business to take all the measurements inside and outside the tank necessary in the work of the engineer in figuring out its capacity. The strapper works under a strict code of instructions, and the following paragraphs on how the strapper does his work are based on the instructions written by H. H. Messimer, tank gauging engineer of Tulsa.

The tank strapper in his reports gives the number of the tank, name of the owner, name of the farm, and its location; depth of tank, thickness of stave, or iron, the circumference of the tank, the quantity and location of all deadwood that displaces oil, the date the tank was strapped and the strapper's name. If the tank has been re-set he so states, giving the old number of the tank.

In strapping wooden tanks the inside perpendicular distance from the top of the stave to the inside bottom of the tank is reported in feet and inches. Ten staves are measured and their average thickness in inches is reported. All circumference measurements are taken with a steel line marked in feet and hundredths of a foot. These measurements are taken at regular intervals of 2 feet, starting at 6 inches above the inside bottom, for example: 6 inches; 2 feet, 6 inches; 4 feet, 6 inches, etc. When obstructions prevent taking at regular points, the strapper takes measurements at 3 inches above or below the regular points and figures back to the regular points before leaving the tank, and in his report he gives notice of what he has done. When differences do not run regularly, the strapper must verify the measurements, and when found correct he marks them "O.K."

In reporting the deadwood in the tank the strapper takes account of the number of upright pieces, measuring width and thickness. On all other deadwood, such as braces etc., he finds the length in feet and inches and marks the location in tank, for example: 28' 8"x2", on the bottom; 45' 8"x6", at a height of from 3 ft. to 3 ft. 6 in. etc. If edgewise the deadwood is so reported. If it lies flat it it so reported. If there is no deadwood it is reported "none." If the tank contains coils of pipe, the number of feet in length and the size of the pipe and its location in the tank are written in on this report.

Iron and Steel Tanks.

In strapping cylindrical iron well tanks the strapper measures from the bottom of the bottom angle iron to the top of the top angle iron, outside the tank. If the tank has one ring the strapper reports one circumference; if it has two rings he takes two circumference measurements, one on each ring. The thickness of the iron of each ring is measured. In reporting deadwood the same method is used as for wooden tanks.

In strapping large steel stock tanks the strapper takes the total depth of the tank outside, the same as on small tanks. In finding circumference he measures the middle of the second ring. He measures the series of sheets (as many as convenient) with his line and reports each series and the total. He reports the thickness of the iron of the second ring. If there is any wooden deadwood, the amount and location is reported. For example he might report that from 0 ft. to 0 ft. 2 in. he found 825 ft. of 8"x2" lying flat; 0 ft. 2 in. to 0 ft. 4 in., were 136 ft. of 8"x2", lying flat; 0 ft. 4 in. to 10 ft. 58 pieces of 8"x6", upright; 10 ft. to 11 ft., 58 pieces of 6"x6" and 1,820 ft. of 1"x6" braces, and so on up the tank, omitting nothing that would displace oil. If the deadwood is steel the strapper is expected to give the number and size of uprights with weight per foot; also the length and size of bases.

(Continued on Page C-184)

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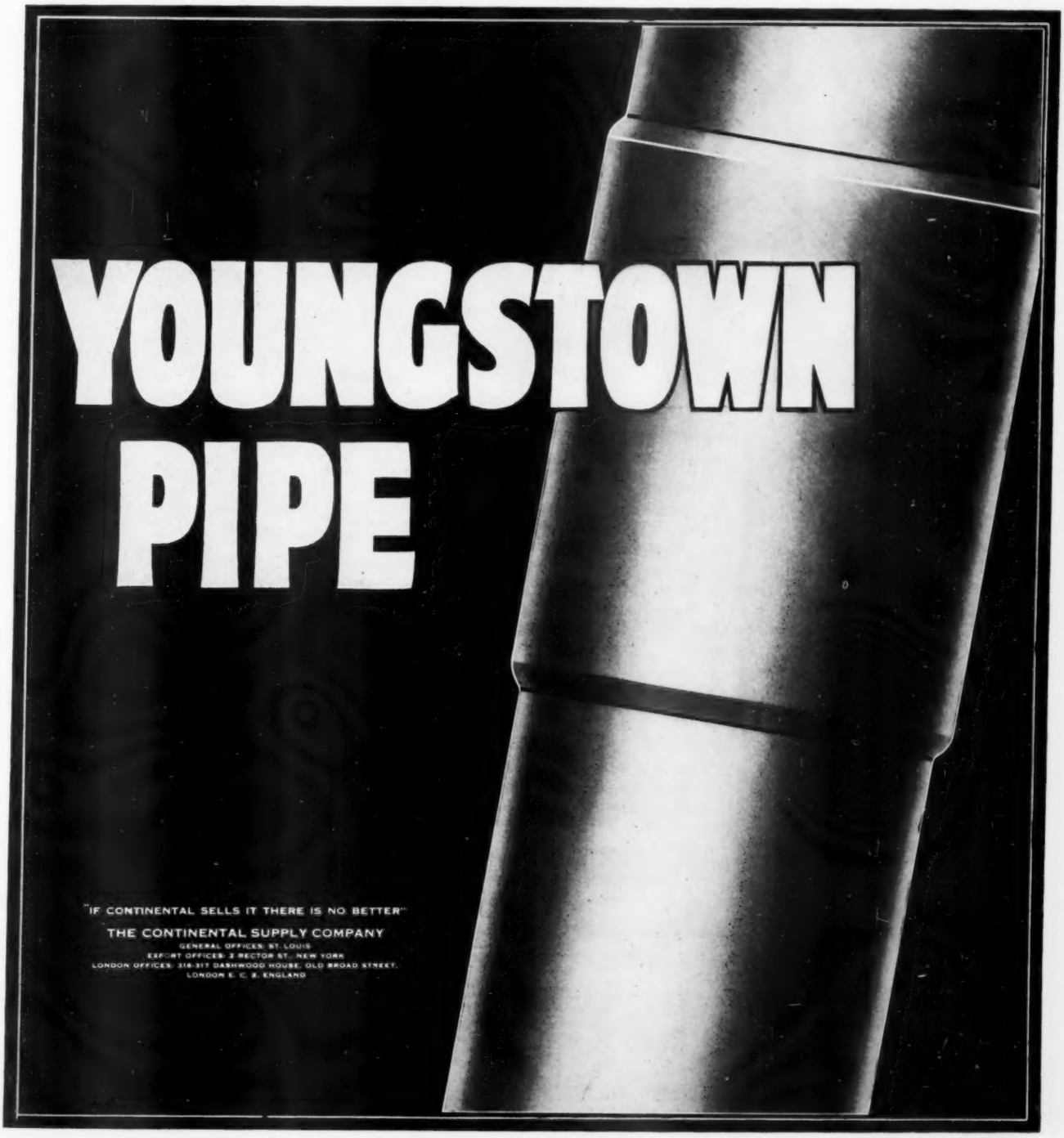
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CONTINENTAL

KENNEDY

VALVES *and* FITTINGS

for oil service

Fig. 781
2500-lb. Test

Fig. 191
1600-lb. Test

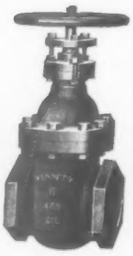
Fig. 187
700-lb. Test

Fig. 57
300-lb. Test

Fig. 58
300-lb. Test

Fig. 188
700-lb. Test

Fig. 192
1600-lb. Test

Fig. 791
2500-lb. Test

Fig. 908

Fig. 910

THE valves and fittings shown here represent but a small part of the big Kennedy line of over 5000 different types and sizes, including globe and angle valves up to 750-lb. working oil pressure, gate valves up to 2500-lb. test pressure, and standard malleable iron fittings, bronze fittings and cast iron flanged fittings and flanges.

By standardizing on KENNEDY VALVES and K-V FITTINGS, you will maintain a high standard and be assured of its continuance whether in refinery or in the pipe lines.

The correct design and performance in your service of KENNEDY VALVES and K-V FITTINGS are assured by a manufacturing experience of fifty years.

Write for the new Kennedy Catalog.

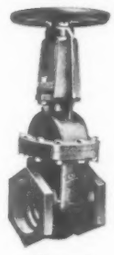
Fig. 601

Fig. 611

Fig. 921

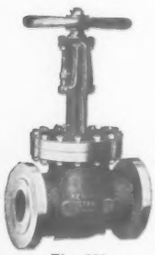
Fig. 923

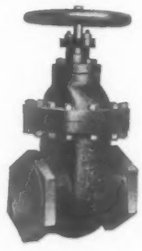
Fig. 761

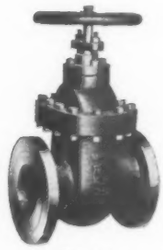
Fig. 76

Fig. 301

Fig. 312

Fig. 319

Fig. 324

Fig. 321

Fig. 322

Fig. 27

Fig. 150

Fig. 103

Standard Bronze Valves

Extra-Heavy Bronze Valves

Fig. 492

Fig. 40

Fig. 544

THE KENNEDY VALVE MFG. CO.

Elmira, N. Y.

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SOME FEATURES OF A PIPELINE SYSTEM

(Continued from Page C-37)

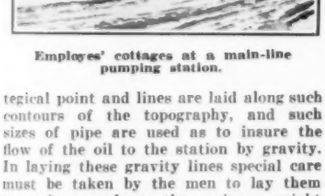
tages with modern provisions are built to provide for the comfort and convenience of the employes and their families. However remote the point might be these dwellings provide the conveniences and comforts of a modern home in a city.

Gathering Systems

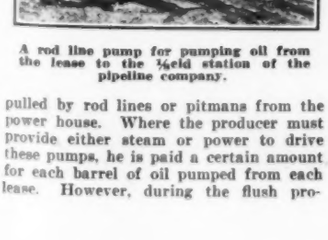
The gathering systems consist of the lines which extend from the field pumping stations to the many points in a producing field, and the discharge lines which carry the oil under high pressure from the field pumping station to some point on the main line. This is the system that gathers the oil in small volumes over a producing field and delivers it into the trunk lines. The gathering system is made up of pipe varying in size from 2 inches up to possibly 8 inches. In a settled field the gathering lines consist largely of 2, 3, 4 and 6-inch pipe.

Pipeline companies must be cautious before making a big investment in lines, and when a new oil field is discovered it is generally the practice to provide storage for the initial production and to observe how extensive the field will be. In case the field is very remote from a pipeline and the production warrants a gathering system, a field pumping station is built and lines are laid to the lease tanks. Then a discharge line is laid from the field station to a loading rack on the nearest railroad, from where the oil is transported to the refinery in tank cars; but if the field continues to develop, a discharge line from the field to the trunk line becomes imperative.

The character of a gathering system depends very much upon the topography of the oil field; if it is possible to obtain the oil from the leases by natural gravity, the field station is located at a strategical point and lines are laid along such contours of the topography, and such sizes of pipe are used as to insure the flow of the oil to the station by gravity. In laying these gravity lines special care must be taken by the men to lay them to such a grade as the engineers might prescribe to obtain a natural gravity flow. This system of gathering oil is economical and efficient, and the oil producers can aid materially in effecting a gravity system for the pipeline company by so locating their lease tanks at points that will facilitate the laying of gravity lines from them. But the topography of the country is often such that the leases being poorly located with respect to the pumping station, it is impossible to take the oil from the producers' tanks by gravity. When this is the case it is necessary to install pumps driven either by steam or pulled by rod lines or pitmans from the power house. Where the producer must provide either steam or power to drive these pumps, he is paid a certain amount for each barrel of oil pumped from each lease. However, during the flush production in an oil field, it is not desirable to lay lines of such size as to handle all of the oil by gravity and it becomes necessary to set steam pumps on the lease to pump the oil to the field stations.



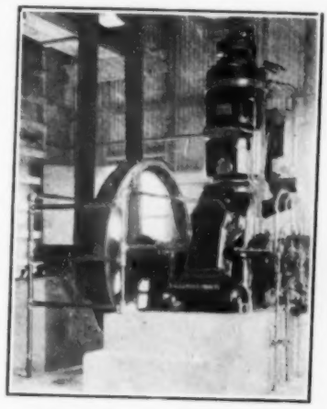
Employes' cottages at a main-line pumping station.



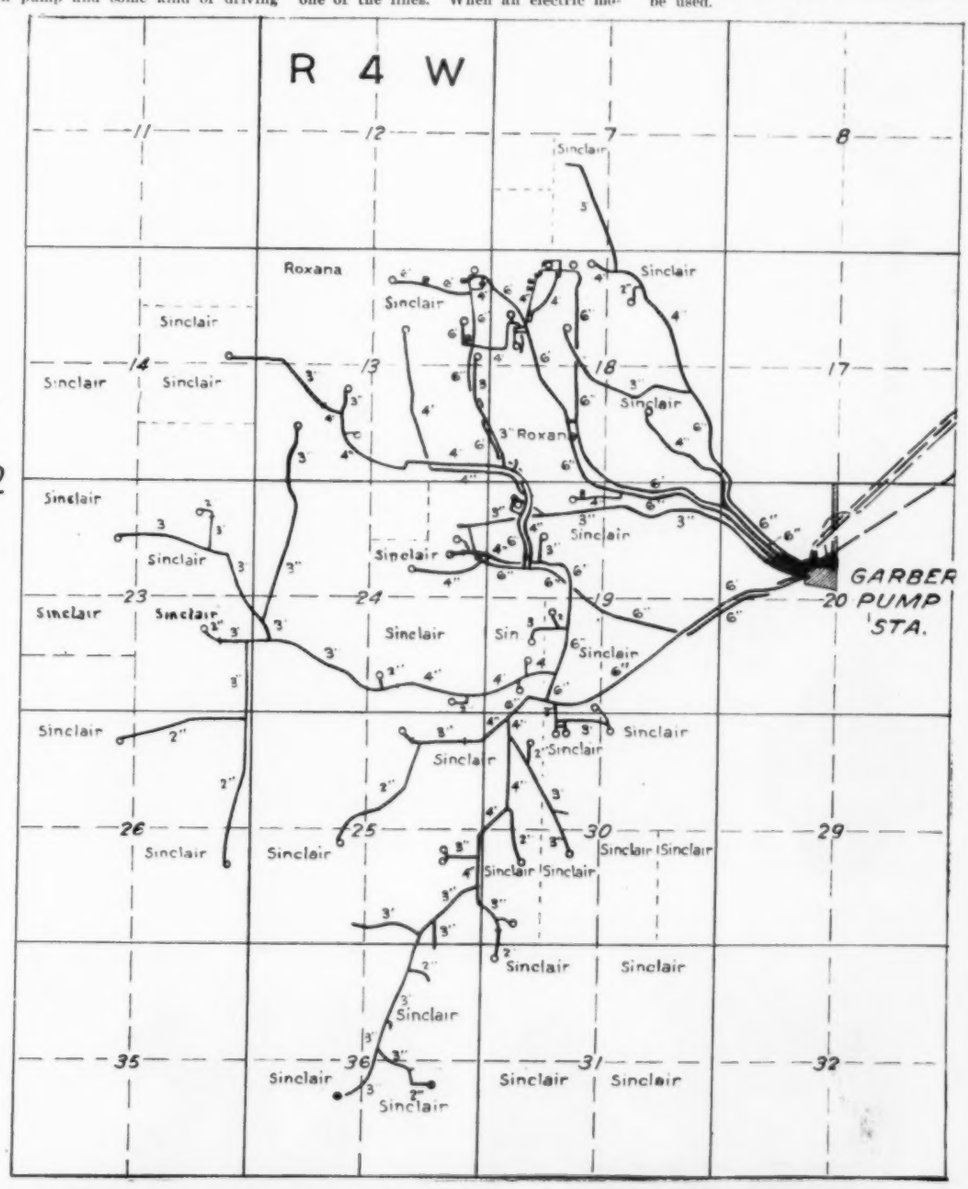
A rod line pump for pumping oil from the lease to the field station of the pipeline company.

These stations are more or less temporary, depending upon the life of the field, and although an effort is made to set up an efficient and economical installation, they do not have the character of the main line stations. The buildings are usually made of wood or steel frame work, sheet iron roofs and walls, and concrete floors. The tankage at these stations will vary in size from 1,000 to 55,000 bbls. The motive power used in the field stations may be a gas engine, an electric motor or an oil engine, depending upon the conditions and the equipment available for the service. A field station will have one or more high pressure discharge pumps, a suction pump and some kind of driving power. Where the oil engine is used in the field stations they will vary in size from 37 horse power to 250 horse power. The history of a field station is that it will be built at first to take care of the initial production and as the field increases in its output of oil additional pumping units are added to the field pumping station and when the field declines these units are taken out as the oil runs from the field decrease. It is with this in mind that the station is built allowing for additional units to be installed as needed. And on account of the rapid rise and decline of the oil fields it is believed a good policy to use pumping and engine units of average size, rather than very large units; so that the equipment at the station can be installed and removed as conditions warrant. In view of this fact field stations have small pumping installations. The pumps are as a rule direct driven, being coupled with a flexible coupling to an oil engine. The auxiliary equipment is driven off the engine shaft by belting and pulleys. A suction pump is provided at each field station for applying a suction on the field gathering system which facilitates and expedites the movement of the oil by gravity from the field. The pump is used also for applying a suction on the discharge lines in case of a break in one of the lines. When an electric motor is used, an induction type is usually chosen, and on account of the rather high speed of the motor, the pumps are driven by pulley and belt or by a chain drive. Often field stations are built in a hurry and temporary methods must then be used.

A pipeline gathering station.



A 37-horse power oil engine in a field



Map showing the Sinclair Pipe Line Co.'s gathering system in the Garber Field in Oklahoma. Note how the lines extend to the individual leases while the trunk pipelines extend from the Garber pump station.

EVERY CLARK-EQUIPP
IS A BOOST FOR CL

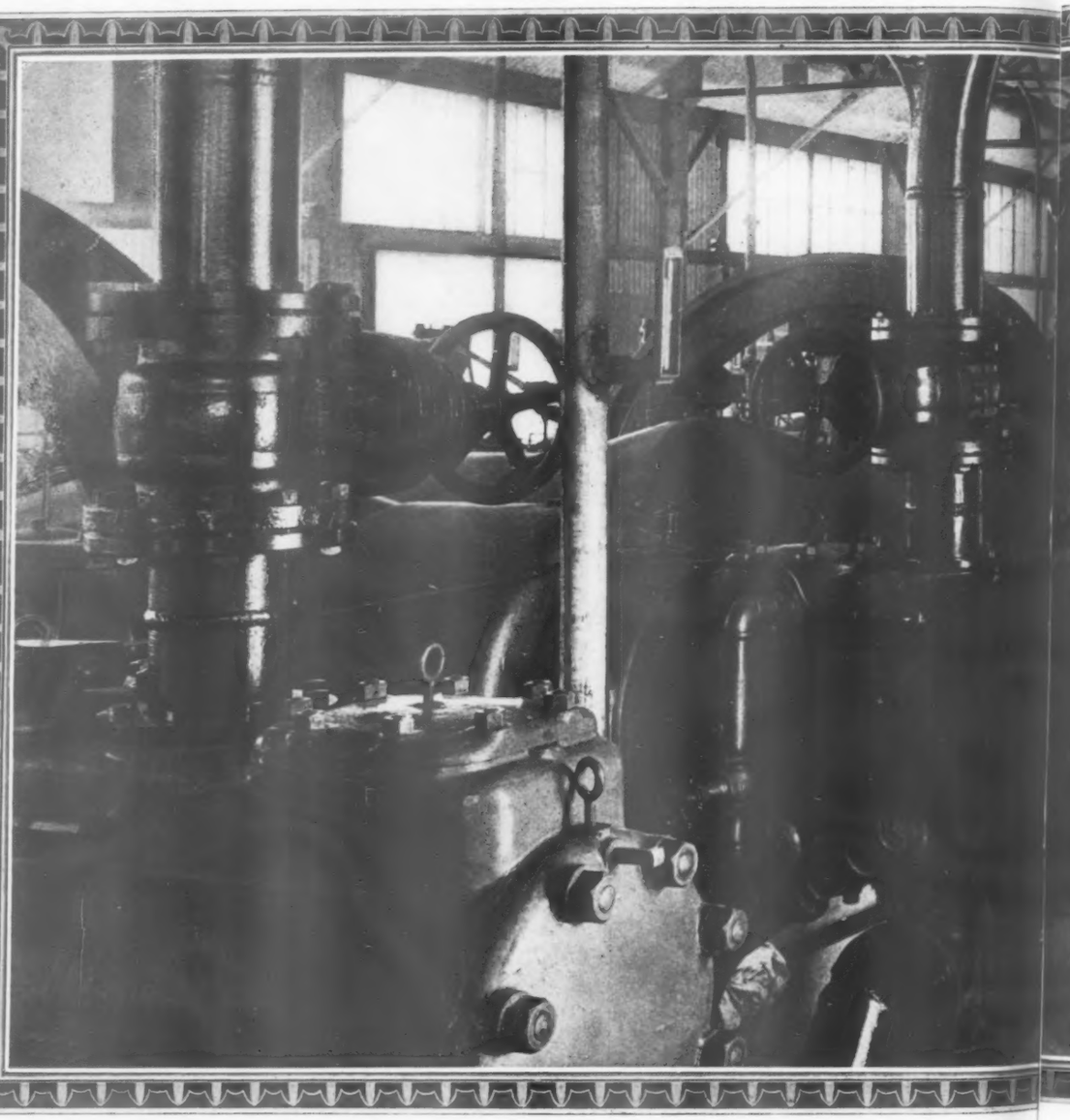


Photo shows Clark installation of thirteen 4-cycle 190 H.P. Twin Clark Compressors in the Ventura, California, plant of the Southern Counties Gasoline Co.

MOST ECONOMICAL

CLARK BROS. COMPANY
Olean, N. Y.
Warehouses at Sweetwater and McCamey, Texas

CLARK COM

P ED BOOSTER STATION
CL ARK COMPRESSORS!

The Seven Counties Gasoline Company have placed three repeat orders with us since the installation of this plant.

MOST EFFICIENT

SALES AND SERVICE

Gas Engineering & Const. Company
125 W. First Street,
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R. A. NELSON
General Superintendent, Empire Pipe Line Co.

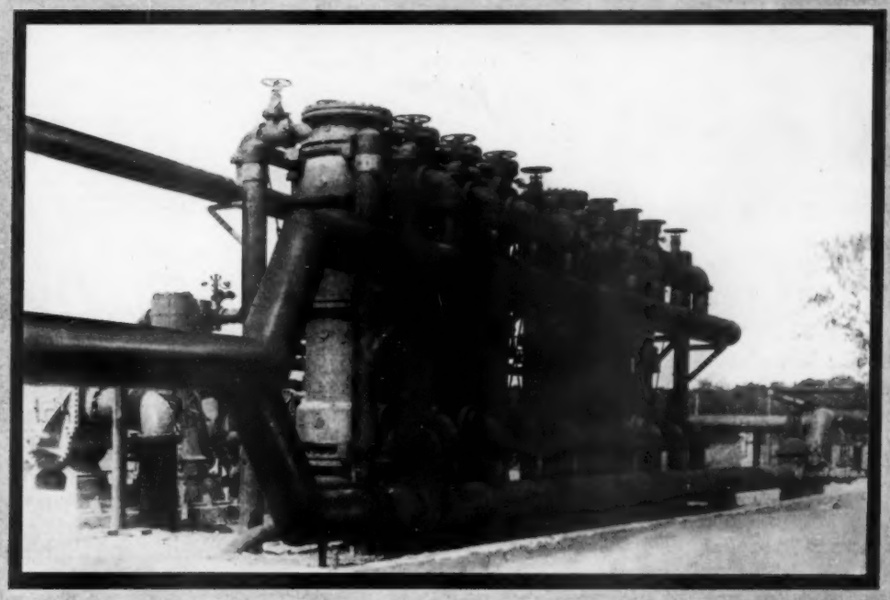
F. K. HASKELL
Manager, Empire Pipe Line Co.

PAUL GRIFFIN
Treasurer, Oklahoma Pipe Line Co.

CHARLES NELSON, JR.
Secretary, Oklahoma Pipe Line Co.

BRAUN

PIPE LINE OIL HEATERS



Typical battery of Braun exhaust steam oil heaters on Mexican pipe line. These heaters operate on 12° A. P. I. crude and are effecting large savings over apparatus previously installed.

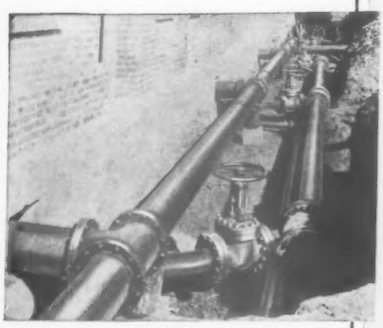
C. F. BRAUN & CO.
Manufacturing Mechanical Engineers
Tulsa Alhambra, Calif. Dallas

BRAUN

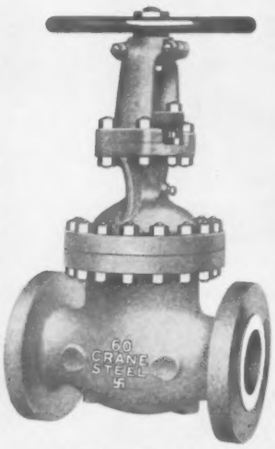
150 Pounds Pressure

CRANE VALVES

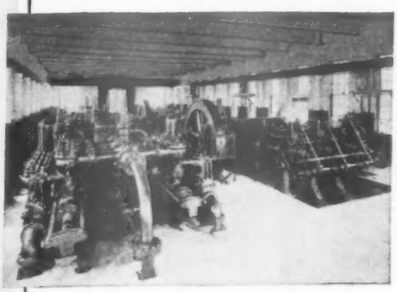
2500 Pounds Pressure



View of piping in Ozark line, showing Crane cast steel valves and fittings in place



Cast steel gate valve No. 76X



One of five high pressure pumping stations in line. Equipped with Crane cast steel gate valves, fittings, and piping materials

One of the many Crane gate valves which stand guard over oil flow through Ozark pipe lines

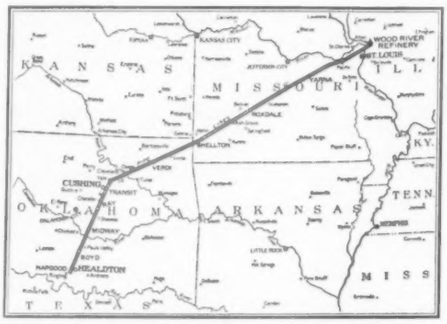
8 years of moving 100 cars of oil 555 miles daily

The Ozark pipe line of the Roxana Oil Corporation is an outstanding feat of oil engineering. From Healdton, Okla., on the edge of the Texas Panhandle, over the Ozarks, through Missouri, under the Mississippi River, to East St. Louis, 555 miles away, it carries 24,000 barrels of oil daily.

The line was laid in 1917-18. Sanderson & Potter, of California, were the supervising engineers. To furnish the power to drive the vast weight of heavy crude oil through the ten inch pipe to its destination, five pumping stations were installed. Working pressures must necessarily be high, 900 lbs.

Under such a load, only the strongest valves and fittings could hope to stand up, even for a single day. Valves must not only be strong but must endure for years. The engineers chose Crane cast steel valves and fittings.

Since 1918, these Crane valves and fittings have borne their burden, daily guiding 100 carloads of oil across two states. So well that the Roxana Corporation advertises service "continuous as the flow" from this line. So satisfactorily that, when a second line paralleling the original was built in 1925, Crane cast steel valves and fittings were again installed.



Map showing route of Ozark pipe line from Healdton to Wood River refinery and locations of five pumping stations along route

CRANE

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CRANE LIMITED: CRANE BUILDING, 386 BEAVER HALL SQUARE, MONTREAL

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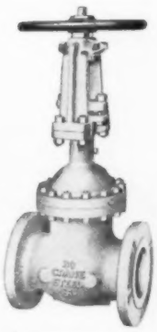
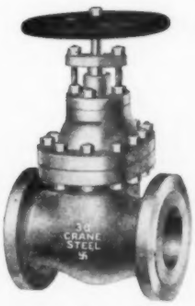
150 Pounds Pressure

CRANE VALVES

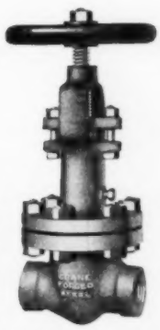
2500 Pounds Pressure



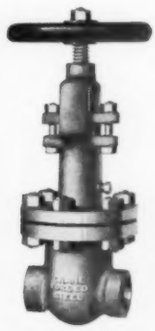
Cast steel gate valve No. 33X



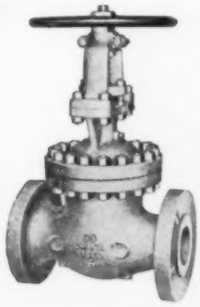
Cast steel gate valve No. 3H



Forged steel globe valve No. 176X



Forged steel gate valve No. 80X



Cast steel gate valve No. 83X

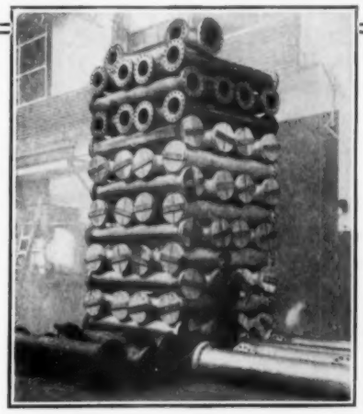
Cast steel relief valve No. 1241H

Cast steel elbow No. 760D

Cast steel screwed or Cranelap flange No. 856D

Cast steel tee No. 264D

Cast steel flanged fitting No. 845D



Stack of cast steel headers ready for shipment to pipe line pumping stations

PRESSURES and temperatures used in the oil and other industries continue to increase. Requirements from valves, fittings, and piping materials daily grow more exacting. Crane Co., keeping constantly in touch with advancing needs, seeks to meet every demand as it arises with materials fully able to fill it.

The demands of the oil industry for valves suitable to high pressure pipe lines and to the high temperature cracking process brought the development of a Crane line of cast steel materials not to be surpassed anywhere in the world. To this line, new items are constantly being added. More recently, Crane forged steel materials have met the need for a valve metal unusually dense and free from flaws, to give absolute tightness under highest pressures and temperatures.

Whatever the future needs of the oil industry, Crane will strive always to fill them as it filled the needs of oil engineers when the Ozark pipe line was built.

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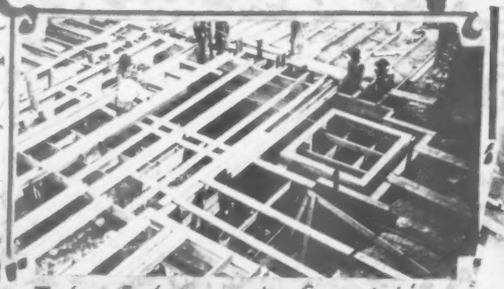
Assembly and Erection of Pumping Station Machinery

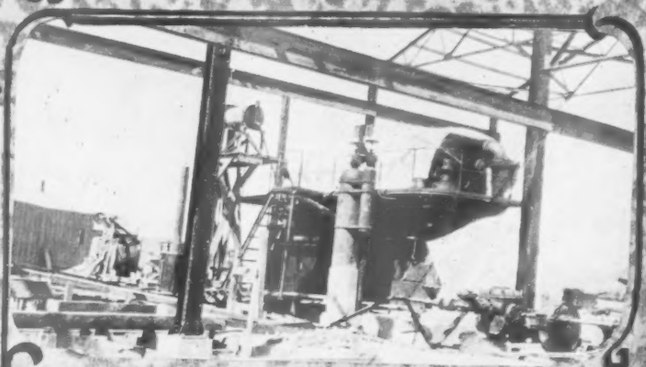


Forms for concrete foundation for machinery

Piling for concrete slab on which machinery rests.

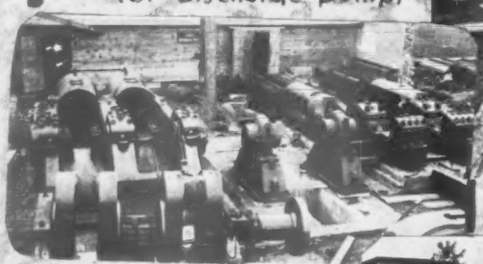
Material at station site.

600 h.p. engine which was hauled 50 miles from railroad for line in Wyoming.



600 h.p. Diesel and 24,000 bbl. pump assembled.

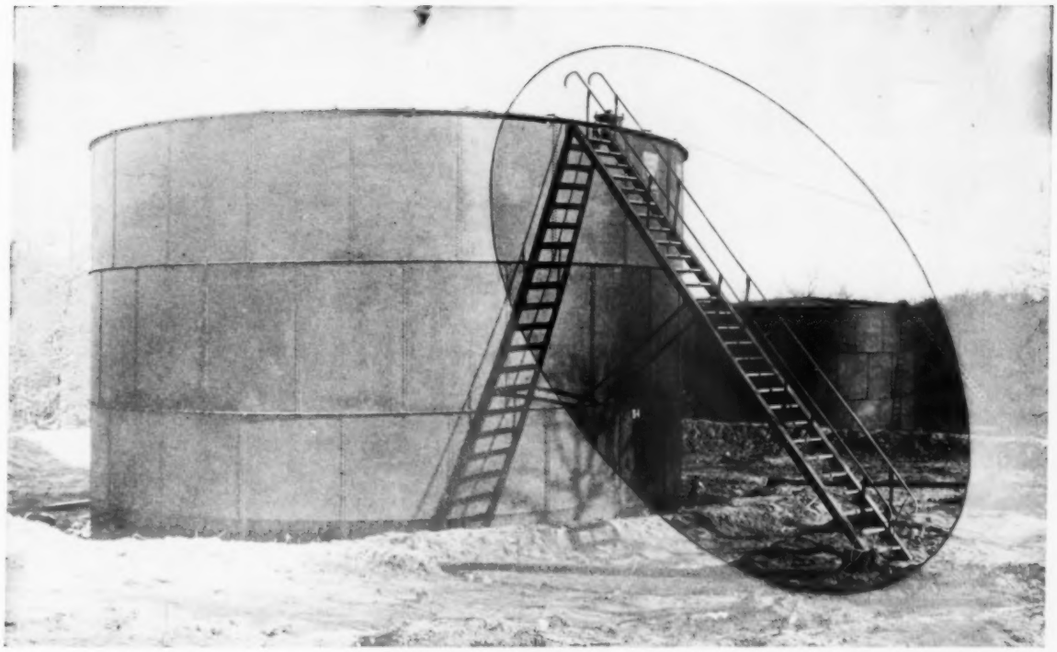
Herring-bone gear for discharge pump.



Engine and pump foundation.

Setting pumps at station

Assembling big Diesel on Wyoming prairie.



Columbian Welded Steel Stairways

The introduction by Columbian of 5000 and 10000-barrel Bolted Steel Tanks accentuated the need in the oil fields for safe, portable and easy-to-mount stairways for tanks. So Columbian pioneered the first and only welded steel stairway. And while about it Columbian engineers designed a stairway adaptable to all sizes of oil field tanks as well as tank farm, pipe line and refinery tanks.

For Any Size Tank

There is the ten-foot length for the one ring tank and the twenty-foot length for the two-ring tank. For the three-ring or higher tank, a ten and a twenty or a twenty and twenty-foot length are bolted together at destination. All stairways over 20 feet in length must be shipped in two sections.

Easy to Erect—Portable

A couple of wrenches are the only erecting tools needed. Bolts are furnished for attaching the hand rail, which has welded-on supports, and for splicing lengths over 20 feet. There are only 24 bolts on a 30-foot stairway. Two men can set up and attach to a tank in an hour. It is just as easily taken down and re-erected.

Safe—Convenient

Each 10 or 20-foot unit of the Columbian Stairway is welded into one integral network of steel. Steps are welded to the inside of the box-channel side members with the weld on the bottom side of the step. Steps have a pressed steel tread, giving maximum foot traction. Steps have a 10½-inch rise. Close enough to let the tired fellow mount the tank like walking and the peppy one will go up three at a time like a sailor or fireman. And the Columbian Stairway will support all the men you can crowd on it.

Sold by Columbian Dealers

In or near every oil field there is a Columbian Bolted Steel Tank Dealer maintaining adequate stocks and trained erecting crews. Let them fit your field tanks, farm tanks, pipe line tanks or refinery tanks with Columbian Welded Steel Stairways.

COLUMBIAN STEEL TANK COMPANY

EST'D 1894

TANKS FOR THE WORLD

1405-1625 WEST 12TH STREET KANSAS CITY, MISSOURI

NATIONAL KLEIN TONGS

JAWS
Forged in dies
Insuring uniformity
Perfect fit on pipe

DIES
Heat-treated
Interchangeable

HINGE PLATE
Adds to strength
Hinge pin in double shear

HANDLE
Extra long
Forged integral with jaw

THE NATIONAL SUPPLY COMPANIES

Slipping River Banks Cause Trouble

Pipeline Problems and Difficulties in Louisiana and Arkansas Swamps Regarded Worse Than Those in Mexico

By James H. Dameron

Every pipeline company has its major difficulties in the construction and maintenance of its lines and in Louisiana and Arkansas there are many problems foreign to other sections.

There are swamps to go through, heavy forests to go in, the Mississippi to cross, large lakes to get lines through and soil that takes a heavy toll in rusting and corroding pipe. In addition, sometimes the pipeliners are forced to take sides in conflicts constantly being waged by nature's forces, such as small rivers that are eternally fighting something else natural and causing pipeline men never-ending trouble.

The Atchafalaya River, tearing through that country of alluvia deposits in central-southeast Louisiana, is one of the smaller rivers constantly on the warpath slicing off sections of its banks and changing its shore line. To the employes of the Standard Pipe Line Co. of Louisiana that river's particular objective is to rip out the Standard's river crossings at Melville station. The crossing at Melville is a part of the trunk system reaching into Kansas and coming south to the Standard Oil Co.'s Baton Rouge refinery.

But the river is not only playing havoc with its shore line at Melville. All along its banks there is mute evidence of that river's destructive fight in carrying away acres of the silt deposits.

Banks Washed Away

During the flood season ton after ton of silt is deposited on the banks and in the bottom lands. At the same time eddies are undermining the banks while additional weight is being piled on top. Recession of the flood water is usually rapid. As the water recedes and seeps from the silt large chunks of the bank collapse and are sucked into the turbulent stream.

Sections of the shore that are carried away in that manner vary in size anywhere from 10 square feet to an acre. Not long ago a section estimated to be 10 acres in area and that had weathered the onslaughts of the river for years, was cut away and carried down stream. The section had a dense growth of fully matured trees on it.

Normally the river's channel is 60 channel is less than a quarter of a mile in width and the bed, like the banks, is of silt and the deposits almost as treacherous.

Such slides as those mentioned above brought grief to the pipeliners when the first line was put across that river in 1910. Likewise it caused the Standard to take sides against the river in its war on its bank. Although troublesome and calling for constant attention, only one line has been lost in that river and that was the first.

The first crossing there was an 8-inch line. It was built in the manner of other river crossings. But the first flood sliced away part of the bank and seared the line and prompted the Standard to build what is sometimes called their crawling line.

Built "Crawling Line"

At the crossing the line was unearthed for some distance back of the shore and relaid on top of the ground. The banks were sloped and another line put across the channel. Then the "life" was put into the line when extra joints of pipe were screwed in and the exposed line bent into a shape resembling an "S." This was done to give the line ample travel slack to draw upon when it was under great strain and as the position of the pipe was being shifted by the river. That the line would not bury itself when the slack was being taken up, more pipe was laid underneath the line to serve as rollers, making pulling of slack less difficult and preventing the pipe from going out of sight.

Rapid recession of the water and changing the position of the line by washing away its foundation did not damage or strain the line too greatly in any one place. As the foundation gave away the weight of the pipe took in more slack. Gradually the pipe on the river bed sinks deeper or is shifted to a new position but in doing so it puts none too great a strain on the pipe on shore. Once during a perilous flood the slack on the river bank was being taken up so rapidly that its movement on shore could be noted by standing close by or holding your foot on the line and feeling it travel.

Under the present system of maintaining the crossing not a single line has been lost. Since 1915 six 8-inch lines have been put across the river at Melville, and are manifolded into a 12-inch line on the south shore. The pipe is double extra heavy river crossing pipe and joined with river crossing clamps.

The crossing leads out of Melville station to Anchorage terminal. The oil is pumped across the Mississippi to the refinery through the Standard Oil Co.'s own lines. At the Atchafalaya River crossing the lines are working under a pressure feet deep and the current swift. The of 600 pounds and the crossing is just a slight distance removed from the pump station.

Use "Wash-Down" Boat

Keeping the crossing intact requires constant attention to the lines on shore and the banks must be kept sloping while the lines have to be kept on the surface. To do this the Standard maintains a wash-down boat to wash away the silt.

During the high water period the boat is brought to the crossing. It is a barge equipped with an oil combustion engine and pumps. The crew plays streams of water on the bank, washing them down, keeping them sloping and the lines exposed. When the task gets too great for the wash-down crew then teams and scrapers are pressed into service.

Another movement on the lines on shore that has to be watched is when the lines are pulling in slack and pull into each other. Sometimes the two outside lines use their travel slack more rapidly than the inside lines and eventually work their way to their nearest neighbor. When that happens the line under the most strain is raised and permitted to crawl over its neighbor. Later more slack is put in that line and it is moved back to its original position. Sometimes it is the inside lines that "crawl" more rapidly and they are handled in a smiliar manner.

The Standard Oil Co.'s Mississippi River crossing is maintained in a similar manner. At the crossing the river is 3,500 feet wide and 110 feet deep at its deepest point. Eight 8-inch lines cross the river there and only one line has been lost.

The oil company's line comes up to the levee and goes over the top of it. A state law prohibits the cutting into levees and all pipelines that cross them go over the top and are covered with sod. On the Mississippi banks tons of silt are deposited on the lines which would bury them and prevent travel slack accomplishing its purpose if permitted to remain. Instead of using a wash-down boat the Standard's refinery fire tug throws big streams of water on the silt and washes it away.

Oxen and mud sled used for hauling pipeline material where tractors could not be used

Red and Sabine Rivers

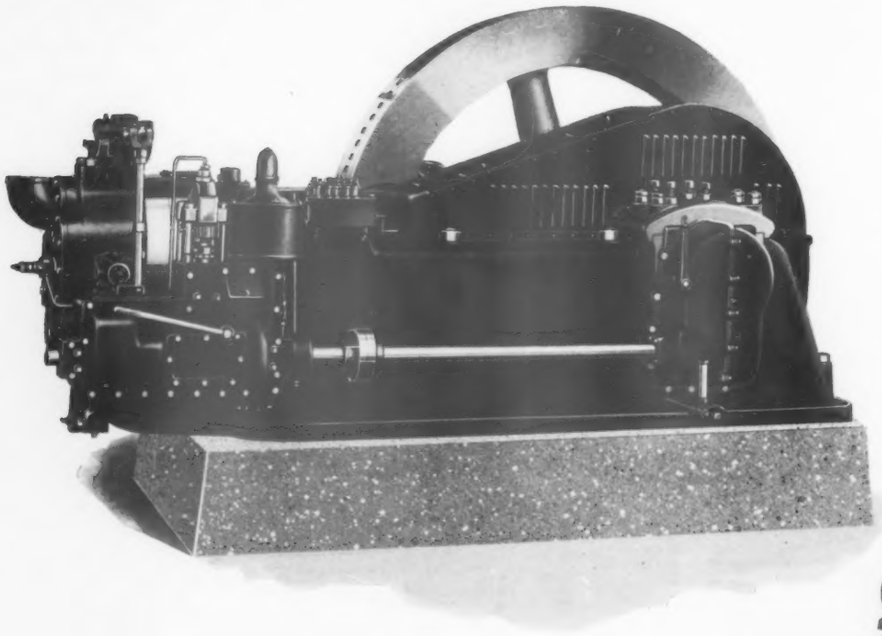
Only two other rivers in the Louisiana-Arkansas district are crossed by the big trunk lines. They are the Red and Sabine Rivers and while difficult to cross neither entails as much grief as the foregoing. The usual procedure in crossing those rivers is to trench down to the mean tide level of the river and then go across with the lines. At The Texas Company's Shreveport refinery and tank farm the Red River threatened to change its course and go through the tank farm. A large long raft was made of logs and sunk with rock ballast on the threatened side and prevented the river from changing its course and destroying the tank farm.

In Arkansas the Arkansas Natural Gas Co. had considerable difficulty with the Red River in crossing there with its Caddo-Little Rock gas line. The present crossing consists of nine 10-inch lines, made into three sets of river crossings of three lines each and manifolded into the main line. The Interstate Natural Gas Co.'s 22-inch Monroe-Baton Rouge gas line will cross the Mississippi at Natchez with eight 10-inch lines.

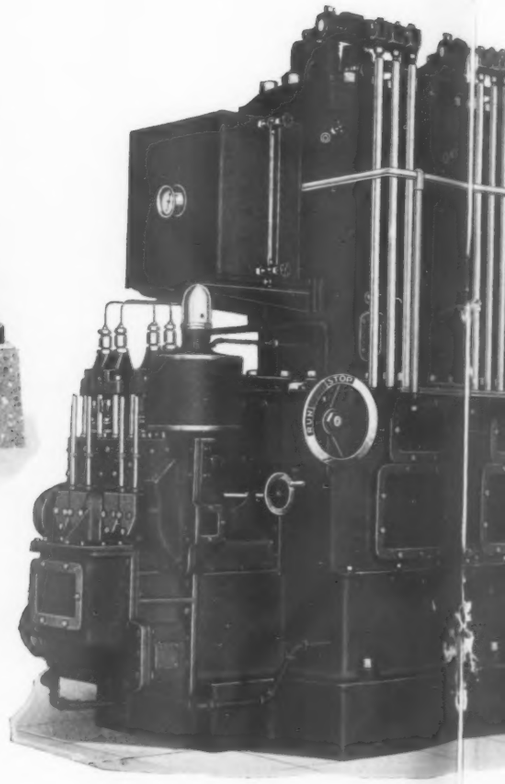
Long swamps cause trouble other than corrosion. Small swamps are easily crossed during the summer months. But during the winter and rainy seasons the lines are laid on high ground and dragged through. Some swamps have to be crossed in that manner under otherwise favorable conditions.

Log raft used for floating pipe through La Fourche swamp

SUPE



SUPERIOR HORIZONTAL TYPE, 4 CYCLE COLD STARTING
AIRLESS INJECTION DIESEL OIL ENGINE



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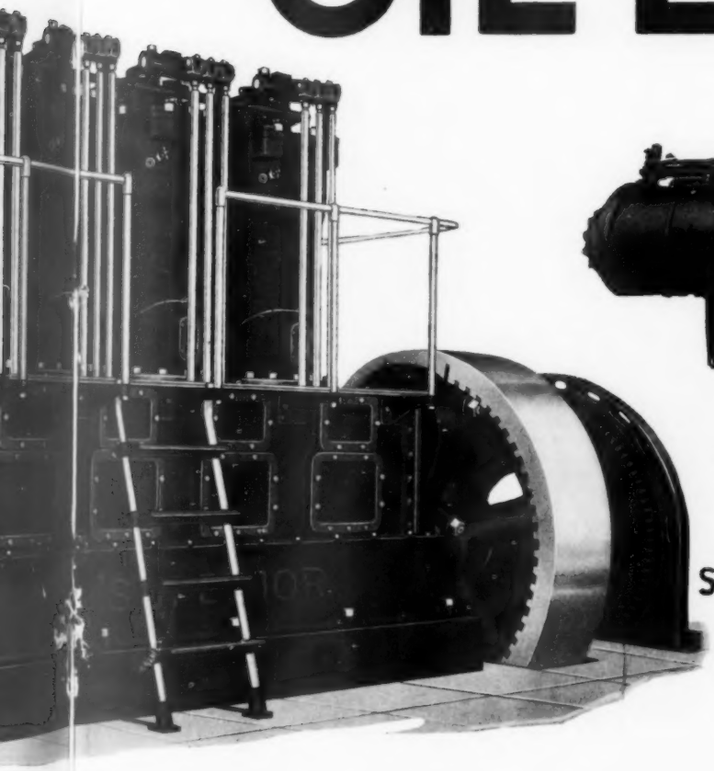
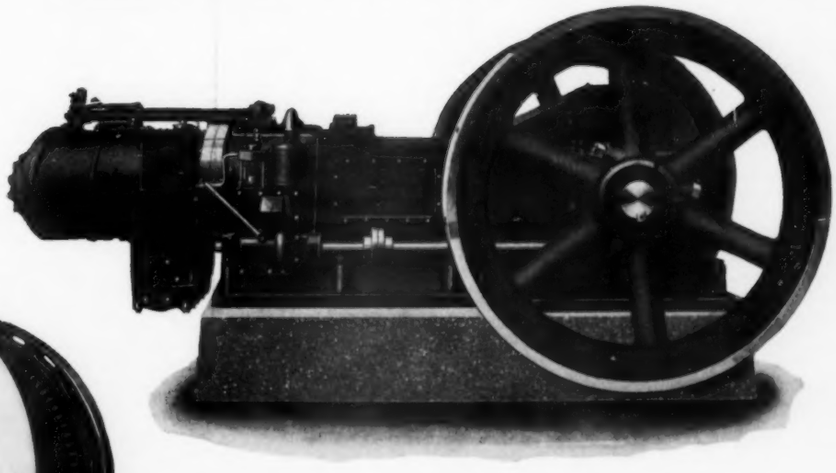




SUPERIOR TYPE, P S SEMI-DIESEL OIL ENGINE

L TYPE, 4 CYCLE COLD STARTING
CTION DIESEL OIL ENGINE

SUPPLY COMPANIES

Engineering Department Has Big Job

Shrinkage of Crude, Losses by Evaporation and Corrosion Some of the Problems in Addition to Surveys

By Andrew M. Rowley

Figuring ways and means of saving 1,000,000 bbls. of oil a year his company loses throughout shrinkage, evaporation and breaks in lines is but one of the many duties devolving upon the chief engineer of one of the major pipeline companies and his department. In considering pipeline construction and operation, it is said, usually, "the engineering department makes a survey of the proposed line," etc., and the hundreds of other important functions of this department of the pipeline industry are often overlooked or not known by the average oil man.

Making a survey for a pipeline is but one feature of the work of the engineering department. Others include the decision as to the proper size of pipe to be used on a line; the location of pump stations so as to maintain the capacity of the line, the topography of the country being of major importance while proximity to good water, a railroad and towns are desirable; the design of the pump stations; type of equipment to be used and the size of this equipment to give the maximum results; the making of maps for the right of way department showing all property owners and distances across properties in rods; the making of topographical maps, showing elevations all along the line to be used in figuring locations of pump stations and distances between stations and, later, to aid in determining what oil might be lost if a break should occur in the line at a certain point; and the compilation of data showing the most desirable fuel to use in the stations, the matter of the type of crude to be handled and the price of coal being important factors.

Records of Equipment

In addition to that work, which has to do almost entirely with the construction of a new line or extension to an existing line, the engineering department, in one of the big companies at least, keeps all records relating to equipment. Township maps are on file for every township in every state where the company does business. These maps show every foot of pipeline owned by the company, the size of the line, the exact length, when the line was laid; what fittings are on the line; what pumps, engines or other equipment or material is on the line; when this material was purchased; from whom; what price was paid; whether this equipment was moved from some other place—in fact, a most complete record of every foot of pipe, every nipple, every piece of machinery and every bit of equipment owned by the company is kept in the form of a card index supplemented by the maps.

This company keeps in stock about $1,500,000 worth of pipe at all times and a record is kept as to the location and soze of every foot of this pipe.

The first work in connection with the proposal to build a pipeline is to make a preliminary survey of the route. This survey is studied and a final survey is then made and the route staked out. Pump stations are located to maintain a balance in the line, that is, so that the capacity of the line can be maintained. Ordinarily these pump stations are located 35 miles apart but this, naturally depends upon the topography of the country, that being an average distance where the land is level. Where there is a drop in elevation, the stations can be located farther apart as it does not require as much pressure to force the oil down grade. Quite often up-grades are encountered and the distance between stations must be lessened. The plan is to permit the line to maintain a certain capacity at a certain pressure and the stations are so located as to balance topographical features of the country.

Location of Stations

Other considerations affecting the location of a station are the proximity of good water for the cooling system; the nearness to a railroad to reduce costs of hauling heavy machinery and equipment as much as possible; and easy access to towns because of the desire to give employes the benefit of association with other persons and facilities for recreation and shopping and good schools for children of employes.

Problems relating to crude oil losses through shrinkage, evaporation and breaks in lines due to corrosion, etc., are referred to the engineering department. The loss through shrinkage alone is estimated at 250,000 bbls. a year to one company. This shrinkage is due largely to changes in the temperature of the oil there being a decrease of one-twentieth of one per cent in the volume of the crude oil for every drop of 1 degree in temperature. Consequently, when the pipeline companies accept crude oil in Texas or Oklahoma, where the average temperature of the oil is around 80 degrees, and then deliver this oil to points in the north where the average temperature is around 60 degrees, that drop of 20 degrees means a difference of 1 per cent in the volume of the crude.

Shrinkage of Crude

From time to time there has been talk of buying crude oil on a temperature basis just the same as the gravity of crude is determined on the basis of a temperature of 60 degrees Fahrenheit. Such a plan would be equitable for all producers, whereas, under the present system, the man producing crude in a section where the temperature average is low does not have the volume of crude he would have were the temperature to be higher. For instance, producers in Kansas lose that difference caused in volume by the lower temperature while producers in Texas benefit by the higher temperature giving them a greater volume than they would have were the weather colder.

Evaporation, breaks in lines and the settling of b. s. and water from the crude result in the other losses in crude sustained each year by the pipeline companies, as stated above, this loss to one company at least amounting to 750,000 bbls. a year.

Much has been done by the pipeline companies to eliminate this loss as far as possible.

Pressure and Capacity

The pressure used on a pipeline is dependent upon the size of pipe in the line. The larger the pipe used, the less pressure that can be applied to the line. The larger pipe cannot withstand as much pressure as the smaller pipe. The following table shows the pressure which may safely be applied to pipe and the capacity of the pipe in barrels per day, all the figures being based on pump stations being located 35 miles apart and the country fairly level:

Size of Pipe	Pressure in Pounds	Capacity in Barrels Per Day
2-inch	1200	850
3-inch	1000	2,150
4-inch	900	4,200
6-inch	800	10,800
8-inch	700	21,000
10-inch	600	35,000
12-inch	500	49,000

8-Inch Pipeline Cost Is $12,925 per Mile Exclusive of Stations

The cost of laying an 8-inch pipeline, exclusive of the expense for the pump stations, is estimated at approximately $12,925 per mile. Pump stations for an 8-inch line cost about $225,000 each, while those in which a number of lines are cared for cost as high as $1,000,000. One large pipeline company has at least three pump stations which cost it $1,000,000 each.

The cost of laying an 8-inch line, exclusive of the pump stations, may be apportioned approximately as follows, the figures being for each mile of line laid:

Pipe	$ 8,500
Fittings	50
Survey	50
Damages	125
Right of way	150
Clearing right of way	190
Ditching	1,125
Laying pipe	550
Stringing pipe	560
Testing line	50
Camps for workmen	400
Total	$11,750
Ten per cent for overhead.	1,175
Total cost per mile, exclusive of stations	$12,925

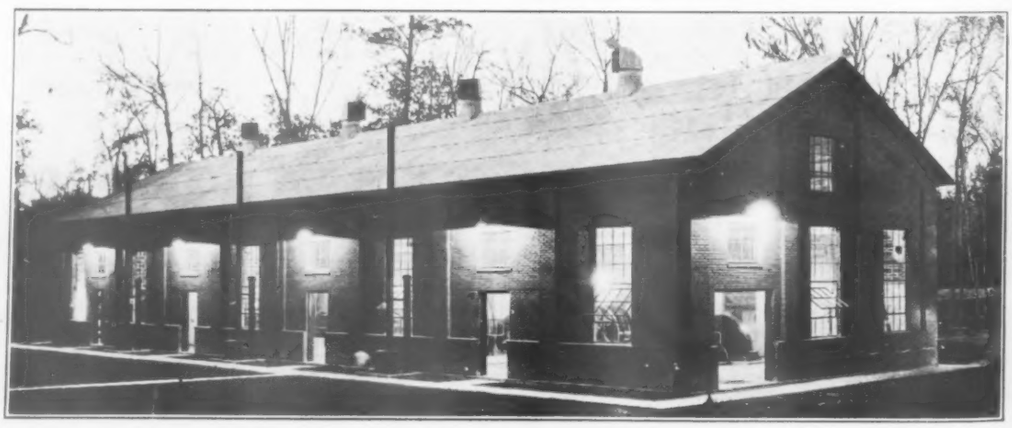
15,000,000 Bbls. Of Crude in Pipelines of Country

It is estimated there is approximately 15,000,000 bbls. of crude petroleum in the pipelines of the United States. These lines, naturally, are kept filled with crude oil which moves through them at an average speed of 4 miles an hour.

The capacity of pipe in barrels of 42 gallons follows:

Size	Bbls. Mile	Bbls. 1,000 Ft.
2	20.517	3.886
2½	32.507	6.071
3	46.162	8.743
4	82.066	15.543
4¼	92.645	17.546
4½	103.865	19.671
4⅞	121.897	23.087
5	128.227	24.286
5⅛	138.026	26.141
5⅝	162.289	30.737
6	184.644	34.971
6¼	200.357	37.946
6⅝	225.121	42.637
7⅝	298.211	56.480
7⅞	318.807	60.244
8	328.265	62.172
8¼	349.102	66.128
10	512.914	97.143
10⅝	579.032	109.665
10¾	592.736	112.261
12	738.596	139.886
12½	801.428	151.786
15¼	1,192.846	225.918
15½	1,232.276	233.386
16	1,313.060	248.686

AN UNUSUAL VIEW OF A PIPELINE PUMP STATION



—Photo by Litterst, Houston, Tex.

The Huffman Station, in Texas, of the Pure Oil Pipe Line Co., since taken over by the Prairie Pipe Line Co. This picture, taken in the evening, is remarkable in that it not only shows the outside of the station but also the machinery on the inside.

PIPE LINE EQUIPMENT

NATIONAL TUBE COMPANY PIPE
CRANE COMPANY FITTINGS & VALVES
SUPERIOR OIL ENGINES
SNOW PUMPS
GOULDS PUMPS
BRODERICK BOILERS
JOHNS-MANVILLE PACKING
MANHATTAN PACKING & BELTING
WYOMING RED EDGE SHOVELS & PICKS
VALDURA PAINT
KLEIN TONGS
C.I. RIVER CLAMPS
B.B. BROTHERS STEEL HOIST
PIPE BRUSHES, JACKS & BOARDS
RIVER DOGS & SOCKETS
CARRYING BARS & TONGS

THE
NATIONAL SUPPLY
COMPANIES

NSCO TRADE MARK

Pipe Lines Expand as Fields Develop

Sinclair Pipe Line Co. Is An Example of How Transportation Companies Take Care of Crude Oil Production

The trunk line system of the Sinclair Pipe Line Co. extends from Houston, Tex., to East Chicago, Ind., and from Freeman, Mo., a point on the Houston-East Chicago trunk line, to Teapot Dome, Wyoming. This system has been developed since the company was formed in 1916. The trunk line system is shown in an accompanying map.

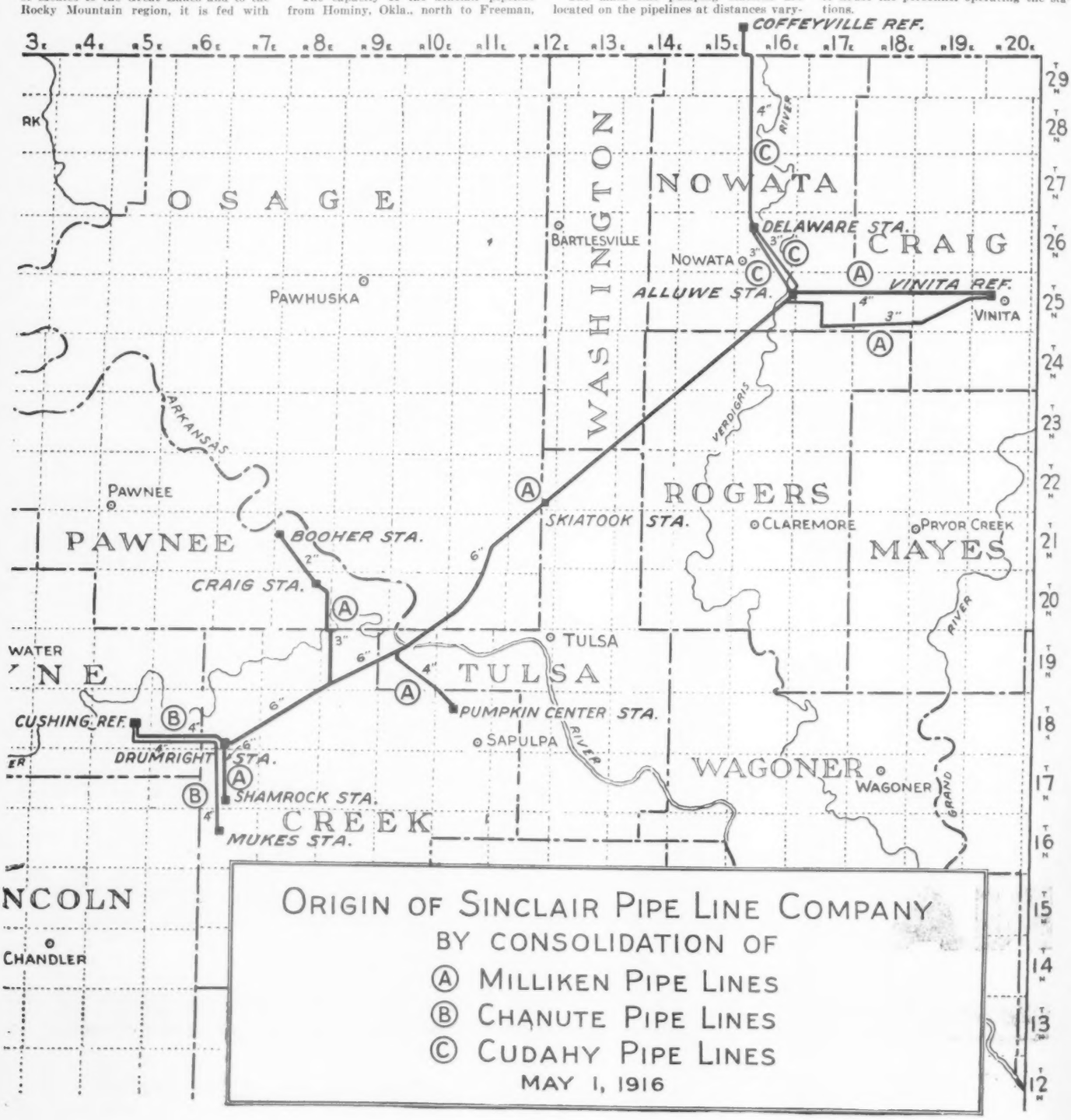
In the extent of this line from the Gulf of Mexico to the Great Lakes and to the Rocky Mountain region, it is fed with lateral gathering systems reaching out to all the principal oil fields of Kansas, Oklahoma and Texas and the Teapot Dome Field in Wyoming.

The trunk line is composed of 6, 8, 10 and 12-inch pipe. The earlier lines consisted largely of 6 and 8-inch pipes, but the more recent lines are 10 and 12-inch pipe. Since the laying of the first lines many loops have been built.

The capacity of the Sinclair pipeline from Hominy, Okla., north to Freeman, Mo., is about 70,000 bbls. per 24 hours. From Freeman, Mo., to East Chicago, the capacity of the line is about 50,000 bbls. per day. The Wyoming line, from Teapot Dome to Freeman, Mo., has a capacity of about 40,000 bbls. per day, while the line capacity from Mexia south to Houston is about 34,000 bbls. per 24 hours.

Main Line Stations

The main line pumping stations are located on the pipelines at distances varying from 38 to 42 miles apart, depending upon the topography of the country. The typical main line station consists primarily of a pumping station, powered by oil engines of the Diesel type, two 55,000-bbl. oil storage tanks, a concrete reservoir, a 45,000-gallon elevated water tower, fuel tanks, manifolds and a piping system for switching the oil. Each station, as a rule, has a group of cottages to house the personnel operating the stations.



protection

cover your pipe lines with a substance as durable as this lake

Digging Trinidad Asphalt from the surface of Lake Trinidad.

THE durable qualities of Trinidad Lake Asphalt—dug from the surface of Trinidad Lake, located off the coast of South America, on the island of Trinidad, dates back to prehistoric times.

The proven ingredients of this natural Lake Asphalt in VAL-U-PAINT when applied, forms a tough elastic coating successfully resisting two of the greatest destroyers of pipe lines—Soil Acids and Electrolysis.

VAL-U-PAINT positively does not contain coal tar pitch. It has successfully met the most difficult trials and today is being used by both the major Pipe Line and Oil companies.

We shall be glad to give you further particulars on this valuable protective paint and assist you with your painting problems.

INDUSTRIAL PRODUCTS COMPANY, Tulsa
904 Petroleum Bldg. Plant, Sand Springs Road

CRUSADER PIPE LINE CO.
OF ARKANSAS
MONROE, LOUISIANA

Gentlemen:

Further to our conversation in regard to your VAL-U-PAINT Pipe Line Paint I beg to advise that the CRUSADER PIPE LINE COMPANY OF ARKANSAS is pleased with the results obtained in the use of this Paint. Several other paints were used as a trial and your product was selected as the best for our needs and use, and has been applied to about 125 miles of 10" Pipe Line, between El Dorado, Ark., and Vidalia, La.

It is very probable that any Pipe Lines that may be laid by this Company in the future will be coated with your product.

Yours very truly,
HENRY CARRINGTON.
Engineer in charge of construction.

A few other satisfied users

Pierce Petroleum Corp.
Mid-Continent Petroleum Corp.
(Cosden & Co.)
North American Car Co.
Sand Springs Railroad
Charles Page Interests
Hope Engineering & Supply Co.
Bartlett Gas Co., Sapulpa
McGraw, Baughman, Bearly Lumber Co.
(Monarch Derricks)
Slater Bros.
(Slater Derricks)
Globe Oil & Refining Co.

Other VAL-U-PAINT products

Metal anti-corrosive paints
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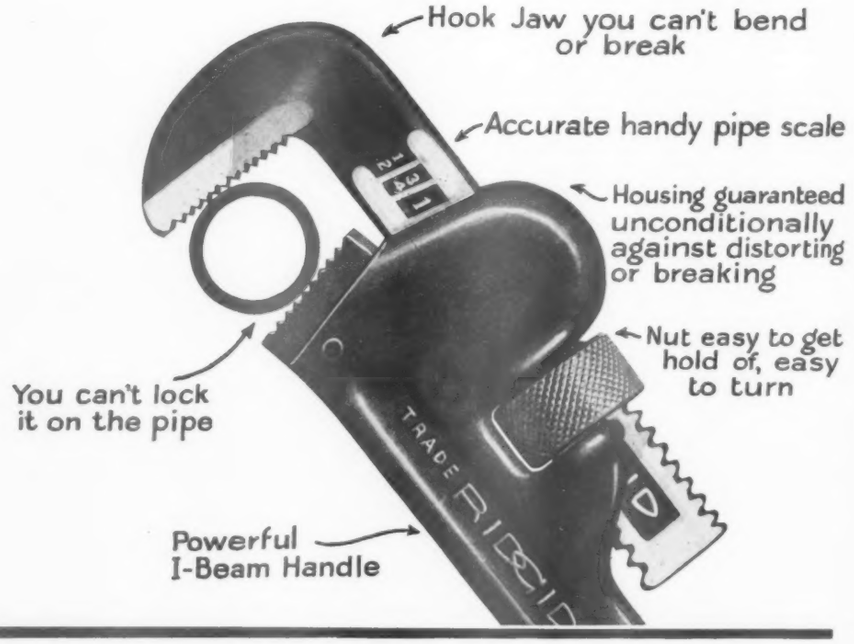
Machinery enamels
Asphalt roof coatings
House and Barn paints

VAL-U-PAINT
INDUSTRIAL PRODUCTS CO. TULSA

Here's a couple of Sinclair men who know the extraordinary stamina of RIDGID wrenches.


Hook Jaw you can't bend or break
Accurate handy pipe scale
Housing guaranteed unconditionally against distorting or breaking
Nut easy to get hold of, easy to turn
You can't lock it on the pipe
Powerful I-Beam Handle
TRADE RIDGID

Sinclair Uses RIDGID Wrenches

THE first year The Sinclair Oil & Gas Co. used RIDGIDs, they greatly reduced their wrench repair expense and wrench replacements. That's why they still use them.

Many other companies in the oil industry have had a similar experience.

The unbreakable RIDGID housing does it. No more warped or smashed housings. No housing repair parts to buy. No expense of making repairs.

How much would this save your company?

RIDGID Wrenches made in all sizes from 6" to 48". Same price as ordinary wrenches. Order from your Jobber or Supply Store. See what your men think of them. They're good judges of good wrenches.

The RIDGID End Wrench

The wrench for pipes in tight places. Turns a pipe flat against a wall. Can't pinch your fingers. Perfect one hand adjustment. Ought to be part of every pipe fitter's kit.

THE RIDGE TOOL COMPANY, ELYRIA, OHIO

RIDGID

PIPE WRENCHES
VISES AND PIPE
CUTTERS

WRENCHES

The pumping stations are generally constructed of steel, concrete, tile and stucco, making the buildings as fireproof as possible. Where the station is remote and the transportation cost is a considerable factor in the construction, or where permanency of the station is doubtful or the climatic conditions warrant, the pumping station building is made of steel framework and sheet iron. In the case of the brick and tile building, a tile firewall separates the engine room from the pump room, whereas a sheet iron firewall is used between these two rooms in the steel and sheet iron buildings.

Station Manifolds

The manifolds are designed to switch the various streams of oil entering or leaving the station. At some stations there will be a receiving manifold, a tank manifold and a discharge manifold. A tank manifold is found at stations where there are more than two tanks, usually where there is a tank farm near the station. Separate receiving and discharging manifolds are used at stations where there are gathering lines entering. Separate manifolds facilitate and simplify the switching of the oil. Where the manifold is complex and large, the high pressure and low pressure manifolds are separate. The practice of using heavy cast iron fittings and many screwed connections has been abandoned and an all-steel welded and flanged manifold is used.

The discharge pumps in the main line stations are designed for high pressure duty; working pressures as high as 800 pounds at the pumping stations can be anticipated. The capacity of the main line pumps vary from 12,000 to 42,000 bbls. per day. These pumps are either duplex or triplex, double acting, plunger type, varying in size fvrom 5x24 to 6x36 inches. The pump revolutions will vary from 36 to 54, working through a gear ratio of 3.70 to 7.17. The pumps are direct connected to the Diesel engines through a flexible coupling: the engine speeds vary from 164 to 257 revolutions per minute.

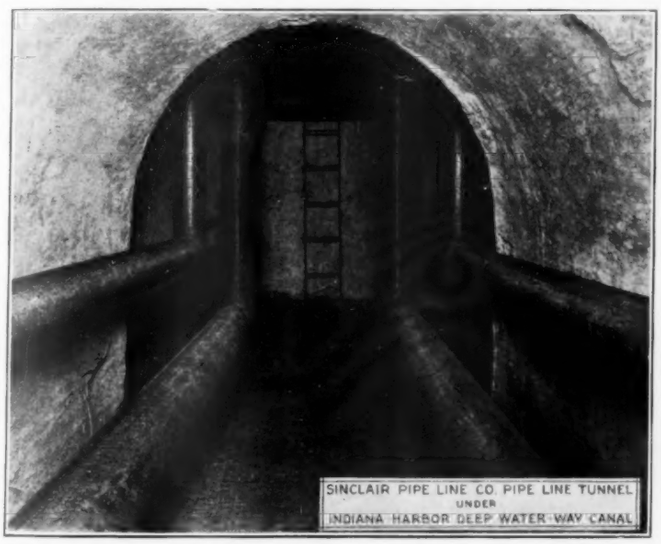
History of Development

Originally the Sinclair Cudahy Pipe Line Co., now the Sinclair Pipe Line Co., was incorporated April 26, 1916, and undertook active business on May 1, 1916. At this time the pipelines of the Milliken Pipe Line Co., the Cudahy Pipe Line Co. and the Chanute Refining Co. were purchased and consolidated into one system.

During the year following May 1, 1916, the Sinclair-Cudahy Pipe Line Co. was busy building a gathering system in the Skiatook, Drumright, Cleveland and Nowata district in Oklahoma. The pipeline gathering system was extended during this time to Bald Hill, Stone Bluff, Bixby, Kiefer, Catale, Wildhorse, Beard, (in Oklahoma) and to Eureka, Toronto and El Dorado districts (in Kansas), where pipeline facilities were needed. The oil division of the United States Fuel Oil Administration requested additional facilities for the transportation of the crude oil from the oil fields. In response to this request, the Sinclair-Cudahy Pipe Line Co. started immediately on the construction of an 8-inch line from Drumright, Okla., to Humboldt, Kans., a distance of 145 miles, and a 6-inch line from Humboldt, Kans., to Freeman, Mo., a distance of about 77 miles. To provide for this increased capacity, 15 additional engines and pumps were installed.

The opening of the Billings Pool, Oklahoma, in 1918, necessitated the construction of a 6-inch line from Hominy, Okla., to Billings, a distance of about 57 miles. A pumping station was built at Billings and a telegraph line was constructed to parallel the pipeline as closely as possible.

In the fall of 1918, the 4-inch line from Freeman, Mo., to Argentine, Kans., was replaced by a 6-inch line, thereby increasing the capacity of the line to that terminal.



In the operation of Diesel engine stations an abundant water supply for cooling the engines is important, and in order to have an adequate supply throughout the year, a reinforced concrete reservoir with a capacity of about 12,000 bbls. is provided. An elevated water tower, about 75 feet high and holding 45,000 gallons of water, is provided at most of the stations to insure adequate circulation of water through the engines by gravity.

The Diesel engine was considered the most economical motive power for the pipeline pumping stations of this system and it is used generally by all pipeline companies in the Mid-Continent Field. At the main line pumping stations of this company, the size of the Diesel engines vary from 250 to 750 horsepower. Smaller units, varying in size from 37 horsepower to 250 horsepower are used in the field gathering stations and for auxiliary units in the main line pumping stations. The early oil engines installed in the pumping stations consisted of 200 to 250-horsepower 4-cycle, 2-cylinder horizontal and 4-cycle, vertical, 4-cylinder units. The recent engine installations have all been vertical, 2 and 4-cycle, varying from 3 to 6 cylinders. The total horsepower of the system, including the semi-Diesel engines, is about 67,000 horsepower; 60,000 of this is Diesel engine horsepower.

pumping stations were built. The lines laid consisted primarily of 2, 3, 4, and 6-inch pipe.

At the same time the gathering system and the stations were being built, an extensive telegraph system was being constructed to connect the various pumping stations with the office of the chief oil dispatcher.

With a fairly extensive gathering system being built, a trunk line from Drumright, Okla., to East Chicago, Ind., was authorized on November 9, 1916. This was the beginning of the extensive trunk line system of the Sinclair Pipe Line Co. This construction program meant the laying of about 145 miles of 6-inch pipe, 528 miles of 8-inch pipe, the construction of 19 pumping stations and about thirty-six 55,000-bbl. tanks. A 6-inch line was laid from Drumright to Humboldt, and the main line from Humboldt to East Chicago was an 8-inch line. At the same time the construction of about 70 miles of 6-inch line between El Dorado, Kans., and Humboldt, Kans., was authorized. Eldorado station and Neal station were built on this line.

Aided During the War

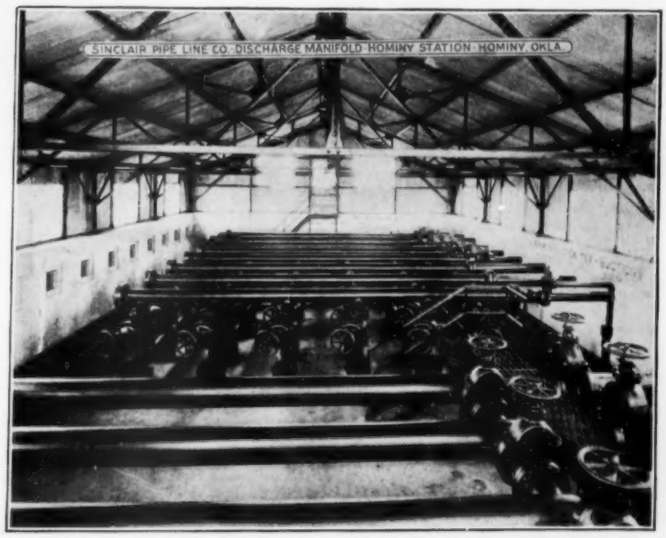
During the World War, fuel oil and other products of petroleum were vital necessities in the prosecution of this war, and in order to make available an adequate supply of crude oil at the refineries and at the seaboard, additional

to East Chicago. The first oil through this line was received at Drumright, Okla., on July 9, 1918. The construction of this line included the erection of pumping stations at Healdton and Tribbey, Payson and Pauls Valley. Also a telegraph line was built from Healdton to Drumright, making connections at each of the four main line stations.

The Ranger Field was being developed in 1918, and instead of constructing a line from Healdton, Okla., to Houston, along the original survey, changes were made to include the Ranger Field. Accordingly, the Sinclair Gulf Pipe Line Co. extended its trunk line system south from Healdton to Ranger with about 150 miles of 8-inch line. Trunk line stations were built at Ranger, Graford and Bowie, Tex.

Developments During 1919

In 1919 the Burkburnett Field in Texas was being developed, and an 8-inch line was built from Healdton, Okla., to Burkburnett, Tex., with a main line station at Devol and a gathering station at Burkburnett. A telegraph system to



In the same year the Garber Pool was opened which necessitated the extension of the Billings line to Garber, where a field station was built and a gathering system was laid.

While a gathering system was being built in Oklahoma and a trunk line system was being extended north and east to East Chicago, Ind., a 6-inch line was being constucted from Healdton, Okla., to Drumright, Okla., where it was to join the trunk line system that extended

Burkburnett was built at the same time. Oil reached Healdton from Devol on November 17, 1919.

During the same year a 6-inch line was built from Lee Springs to Eldorado station, Kansas. An extension of the telegraph system was added between Humboldt and Coffeyville, Kans.

In January of 1920 the word "Cudahy" was eliminated from the corporation's name, changing it to "Sinclair Pipe Line Co."

Except for small field stations and gathering lines, there were no major extensions to the system during 1920.

Developments in 1921

Several important extensions were made in this year. An 8-inch line was laid south and east out of Drumright extending to the Deaner and other fields developing near Henryetta, and passing through the Bristow and Slick districts where production was giving promise of considerable development. During this same year the Duncan Field was being developed and the Sinclair Pipe Line Co. laid an 8-inch line south from the Duncan Field to connect to its Devol-Healdton 8-inch. This Duncan extension and the Duncan station were abandoned in the year 1924. Ivan and South Bend stations in Young County, Texas, were built with 4 and 6-inch lines connecting them at Caddo to the Ranger gathering system. Florence station, Kansas, along with a 6-inch line to Lee Springs station, Kansas, was built.

A 6-inch line was constructed to connect the Burbank Field with Hominy station, and a station at Burbank together with gravity system to the field was built.

In the fall of 1921 the Mexia Field rapidly developed and the company decided to proceed with the original plan of extending its trunk lines to the Gulf by laying a combination 8 and 10-inch line from Graford, which is a point between Ranger and Healdton, to Mexia. This line was completed together with the gathering system and station at Mexia and the two intermediate stations at Cresson and Lakenon, in the early part of 1922.

Big Development in 1922

During this year plans were laid to complete the trunk line system from Mexia to the Gulf of Mexico thus permitting the transportation of oil from the Mid-Continent fields to the Atlantic Seaboard by tankers and to more than double the capacity of the main trunk line to Chicago. Late in 1922 work was started on both these projects which involved the construction of about 160 miles of 8 and 10-inch line with three main line pumping stations at Easterly, Singleton and Hufsmith, respectively, between Mexia and Houston; and over 400 miles of 12-inch and 380 miles of 8-inch with additions to all of the pumping stations along the line between Drumright, Oklahoma and Chicago. The extension to the Gulf was completed in the spring of 1923 and the loops to the Drumright-Chicago line in the fall of that year.

Another addition to the trunk line facilities of the company was the extension of a 6-inch discharge line from Blake station in Oklahoma, to Coffeyville, Kans.

To handle a large production of crude oil that was developed in the Bristow district during the year 1922, Catfish and Bristow stations were built, and an 8-inch line was laid from Catfish station to Shamrock station, Oklahoma; also an 8-inch line was built between the Catfish and Bristow stations. This arrangement gave two outlets.

A small pool was developed near Okemah, Okla., and this necessitated an extension of a 6-inch line from Henryetta station to a point in the field where the Okemah station was being built and a gathering system was being laid.

In the fall of 1922, a telegraph and telephone system was built from Mexia, Tex., to Houston, Tex., connecting the intermediate pumping stations.

Extensions in 1923

The construction of the Teapot-Freeman trunk line, from the Rocky Mountain region to Freeman, a point on the Mid-Continent trunk line system in Missouri, was started in March of 1923. Within a year this line, 720 miles in length, with 17 pumping stations along its course, was finished, and oil was started through the line on March 12, 1924. Within 30 days the line was filled and oil was received at Freeman, Mo., the terminal of the line on the Mid-Continent trunk line system. The construction of this line through a rather unfrequented country was a real task and the completion of it in about a year was an unusual accomplishment. This line, which has a capacity of 40,000 bbls. per 24 hours, is the only trunk line out of the Rocky Mountain region, which makes it possible to draw upon the oil reserves of the Wyoming, Montana and Colorado oil fields in case of a national emergency. This line consists of a few 8-inch loops, and a portion of it is 10-inch pipe; but the greater amount of the line consists of 12-inch pipe. The line was built in the face of many obstacles and much discouragement, and contrary to many predictions otherwise, the system functions beautifully when handling the rather viscous Salt Creek crude oil.

The development of the Tonkawa Field necessitated the construction of a pumping station near the field and the laying of a 4-inch discharge line from the station south to the Billings-Hominy 6-inch line. The continued increase in the production of the Tonkawa Field made it necessary to increase the pumping facilities of the station and to lay an additional 4-inch line to the Billings-Hominy 6-inch line. To insure an adequate line capacity out of Tonkawa station, the Tonkawa-Burbank 8-inch line was laid in May of this year.

The development of the Holdenville-Wewoka Field in Oklahoma, brought about the building of a pumping station near Wewoka and the laying of a gravity gathering system and an 8-inch discharge line from the Wewoka station to the Okemah station.

The production of the Powell Field warranted the building of an 8-inch discharge line from Mexia to the Powell Field, where a pumping station was built and a gathering system was laid in the field; this was in the fall of the year 1923. A telegraph and telephone system was built also to the field.

New Construction in 1924

The major extension of the system during the year was the building of an 8-inch line from the Cromwell station, Seminole County, to the Payson station on the main line between Drumright and Healdton. Previous to the building of this line in the fall of this year, two 3-inch lines had been laid early in the year between Cromwell and Okemah station to take care of the initial production; later a 4-inch and a 6-inch line replaced the two 3-inch lines. The 4-inch line between these stations has been taken up recently. As the production of the Cromwell Field increased, additional units were installed at the Cromwell pumping station.

Developments in 1925

During the first several months of the year 1925, the Mexia-Houston line was looped with about 73 miles of 8-inch line, part of which was laid between each of the main line stations. An additional pumping unit, consisting of a 250-horsepower Diesel engine and a 5½x24 duplex pump, was installed at Mexia. Easterly, Singleton and Hufsmith. The looping of this line increased the capacity of the line from Mexia to Houston to 34,000 bbls. per day.

The discovery of the deep sand in the Garber Field made it necessary to increase the capacity of the lines out of this field; accordingly, a 6-inch line was laid to parallel the two 4-inch lines from Garber to Billings, and from Billings the 6-inch line was laid to connect with the Tonkawa-Burbank 8-inch line. Garber station was rebuilt and additional pumping units were added. The pumping units at this station consisted of a 250-horsepower Diesel engine connected to a 5½x24 pump, and three 75-horsepower engines connected to pumps with capacities of about 225 bbls. per hour. Recently an electric motor of 125 horsepower was installed and its service has been satisfactory.

In the Browning district, Kansas, a pumping station was built to take care of the production in the Browning Field. A gathering system to the field was built, and two 4-inch discharge lines were laid during the first part of the year from Browning station to the Eldorado-Humboldt 6-inch discharge line.

Development Work in 1926

While no major development work has been done so far this year, quite a number of field stations with the connecting lines have been installed, notably in the development in Greenwood and Butler Counties, Kansas. The gravity system with a new station was also installed in the Nocona Field, Montague County, Texas. A station and gravity system have been built in Seminole County, Oklahoma, where development is very active.

Summary

Although this company is only 10 years old it has built one of the major pipe line system extending as it does from Chicago to the Gulf of Mexico, with a branch into Wyoming, and comprising about 4,000 miles of trunk and 2,000 miles of gathering lines. It is noteworthy that in the 15 months from November, 1922, inclusive, the Sinclair Pipe Line Co. laid 1,850 miles of 8-inch, 10-inch and 12-inch pipe. Nearly half of this pipe (over 880 miles) is 12-inch.

It is the policy of the Sinclair Pipe Line Co. to keep abreast of and render the best possible service in the fields which it serves and to assist in every possible way in the economical development of the oil industry.

EMPIRE PIPE LINE COMPANY'S SYSTEM

The following statement shows the extent of the main lines of the Empire Pipe Line Co., the size of the pipe and length, starting at the northern end:

Location—	Size of Pipe (Inches)	Length (Miles)
Teter Station to Eldorado, Kans.	4	55
Eldorado, Kans., to Ponca City, Okla.	8	81
Ponca City to Cimarron (Guthrie)	8	54
Cimarron to Cushing	8	32
Tonkawa to Ponca City	6	12
Burbank to Ponca City	4	32
Burbank to Cushing	4	57
Cushing to Kingwood	6	55
Kingwood to Okmulgee	4	28
Healdton to Gainesville, Tex.	8	45
Healdton to Waurika, Okla.	8	32
Waurika to Duncan	4	21
Total length		503

In addition to the above there are 314 miles of gathering lines. Locations of the stations referred to above are as follows:

Teter, Section 22 23-9, Greenwood County, Kansas; Eldorado, Section 17-26-5, Butler County, Kansas; Ponca City, Ponca City, Okla.; Tonkawa, Section 26-25-1w, Kay County, Oklahoma; Burbank, Section 12-26-5, Osage County, Oklahoma; Cushing, Section 15-17-5, Payne County, Oklahoma; Kingwood, Section 22-11-11, Okfuskee County, Oklahoma; Okmulgee, Okmulgee, Oklahoma; Healdton, Section 3-4 3, Carter County, Oklahoma; Gainesville, Gainesville, Texas; Waurika, Waurika, Okla.; Duncan, Section 33-1s-8w, Stephens County, Oklahoma.

The principal towns served by this pipeline system are as follows: Madison, Eldorado, Augusta, Douglass, Winfield and Arkansas City, Kansas; Newkirk, Ponca City, Tonkawa, Perry, Guthrie, Cushing, Yale, Burbank, Drumright, Bristow, Okmulgee, Henryetta, Healdton, Waurika and Duncan, Oklahoma; Gainesville, Tex.

The average quantity of crude handled through the main line system for the past year was 28,100 bbls. per day.

RECONDITIONING A PIPELINE

A machine is used to clean the pipe thoroughly before the protective coatings are applied.

FOR MODERN PIPE LINES

WESTCOTT VALVES

"IF CONTINENTAL SELLS IT THERE IS NO BETTER"

THE CONTINENTAL SUPPLY COMPANY

GENERAL OFFICES: ST. LOUIS
EXPORT OFFICES: 2 RECTOR ST., NEW YORK
LONDON OFFICES: 316-317 DASHWOOD HOUSE, OLD BROAD STREET, LONDON E. C. 2, ENGLAND

CONTINENTAL

300,000

Owners' actual records of White mileages~

72 Whites have run **500,000** miles and more each

384 have run between **300,000** and **500,000** miles each

951 have run between **200,000** and **300,000** miles each

1658 have run between **150,000** and **200,000** miles each

4959 have run between **100,000** and **150,000** miles each

giving the astounding total~

8024 Whites have run **100,000** miles and more each

300,000 miles is 12 times around the earth at the equator.
. . . It is more than the total miles of railroads in the United States.
. . . It is 100 times the distance from New York to San Francisco.

Nowhere does the meaning of 100,000 miles stand out more clearly and forcefully than on the balance sheet. Here White is a synonym for profit.

Our new "300,000 Miles and More" booklet is just out, with the names of all the owners and the number of Whites each owns in each mileage classification. You will find leaders in all industries, firms in your own line of business, your neighbors, your business associates. We will gladly send the booklet free. Write for it.

Before you buy a truck or a bus see the Whites at any of our 75 factory branches or 500 dealers. There is a White model to meet every transportation need.

	Truck Chassis	
Model 15	— ¾-Ton	$2,150
Model 20	— 2-Ton	2,950
Model 51	— 2½-Ton	3,750
Model 40A	— 3½-Ton	4,350
Model 52	— Heavy Duty	5,100

(Several types of power dumping bodies and hoists available)

	Bus Chassis	
Model 53	16 to 21 passengers	$4,250
Model 50-B	25 to 29 passengers	5,350

(All prices f. o. b. Cleveland)

WHITE

and WHITE

200,000 100,000 miles and more

No owner will operate a truck or bus long enough to run 100,000 miles . . . unless those miles are money-earning miles

100,000 miles—White miles—mean more than an exceptionally long distance; more than an exceedingly durable, well-built, well-serviced motor truck or bus.

They mean unusual profits. They mean net earnings—in excess of all costs. They mean continued earnings long after the original cost has been written off the books.

200,000 miles mean all that—doubled. 300,000 miles mean all that—trebled. So on . . . . Picture the earnings of the scores of Whites that have exceeded 500,000 miles. Then picture what these mileages would mean in your own business, knowing your average mileages for a week or a month or a year.

White 100,000-mile records are not isolated performances, not special achievements under especially favorable conditions. Whites, by the thousand, exceed 100,000 miles with a regularity that makes it standard performance. . . . . All models do it. They do it in all lines of business. They do it everywhere, under all conditions of load, road, weather and climate. They do it in fleets and in single installations.

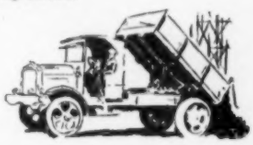
More than 8,000 Whites have run 100,000 miles and more. More than 1,400 have run 200,000 miles or more. More than 400 have exceeded 300,000 miles. The original cost of most of these 8,024 Whites has been written off the owners' books. . . . . And these mileages are actual owners' figures. They do not include many hundreds of additional Whites that have passed 100,000 miles, but whose owners have not sent us accurate records. Neither do they mirror the splendid earning records of thousands of Whites that have been serving dependably for ten, twelve, fourteen years, carrying their pay loads, without reaching the 100,000-mile mark.

This record, published annually, stands alone. No other truck manufacturer has ever published such a volume of evidence of dependability, long life and continuous earning power. No other truck manufacturer can.

In light delivery service 100,000 miles means millions of packages delivered at lowest cost. Whites build business and swell profits.

Some White Busses have run more than 500,000 miles. More than 200,000 miles for a White Bus is usual performance. And they are all money-earning miles.

Translate 100,000 miles into the terms of any sort of hauling—tons, yards, packages, cases or gallons—and the meaning is always money earned.



In service where loads are heavy and hauls are short it may take many years for a truck to run 100,000 miles. Hundreds of White Dump Trucks have passed this mark and are still earning.

THE WHITE COMPANY
CLEVELAND

TRUCKS
BUSSES

© THE WHITE CO., 1926

Prominent Pipe Line Company Officials

FRED C. COOK
Asst. Manager, Real Estate and Tax Dept., Northern Group Pipe Lines

F. M. TOWL
President, Southern Group Pipe Lines

W. H. FLANN
Superintendent of Telegraph, Northern Group of Pipe Lines

M. O. HOFFMAN
Purchasing Agent, Northern Group Pipe Lines

J. H. PEPER
Chief Engineer, Northern Group Pipe Lines

J. L. GIBBONS
Freight Traffic Manager Northern Group Pipe Lines

E. M. WELSH
Oil Traffic Manager, Northern Group Pipe Line

THE JOHN CRERAR LIBRARY

THE ALLEN WELDED PIPE JOINT

Fig. 1. Vertical section, shows how weld is reinforced and eliminates icicles of buttweld joints.

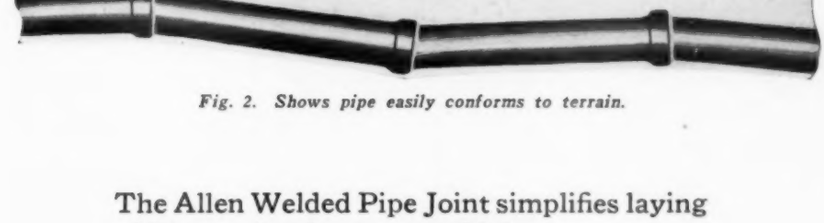


Fig. 2. Shows pipe easily conforms to terrain.

The Allen Welded Pipe Joint simplifies laying of lines and reduces cost of labor.

Extensively used for pipe line and casing in California fields.

This joint solves the problem of slack in pipe lines and eliminates 90% of fire bends.

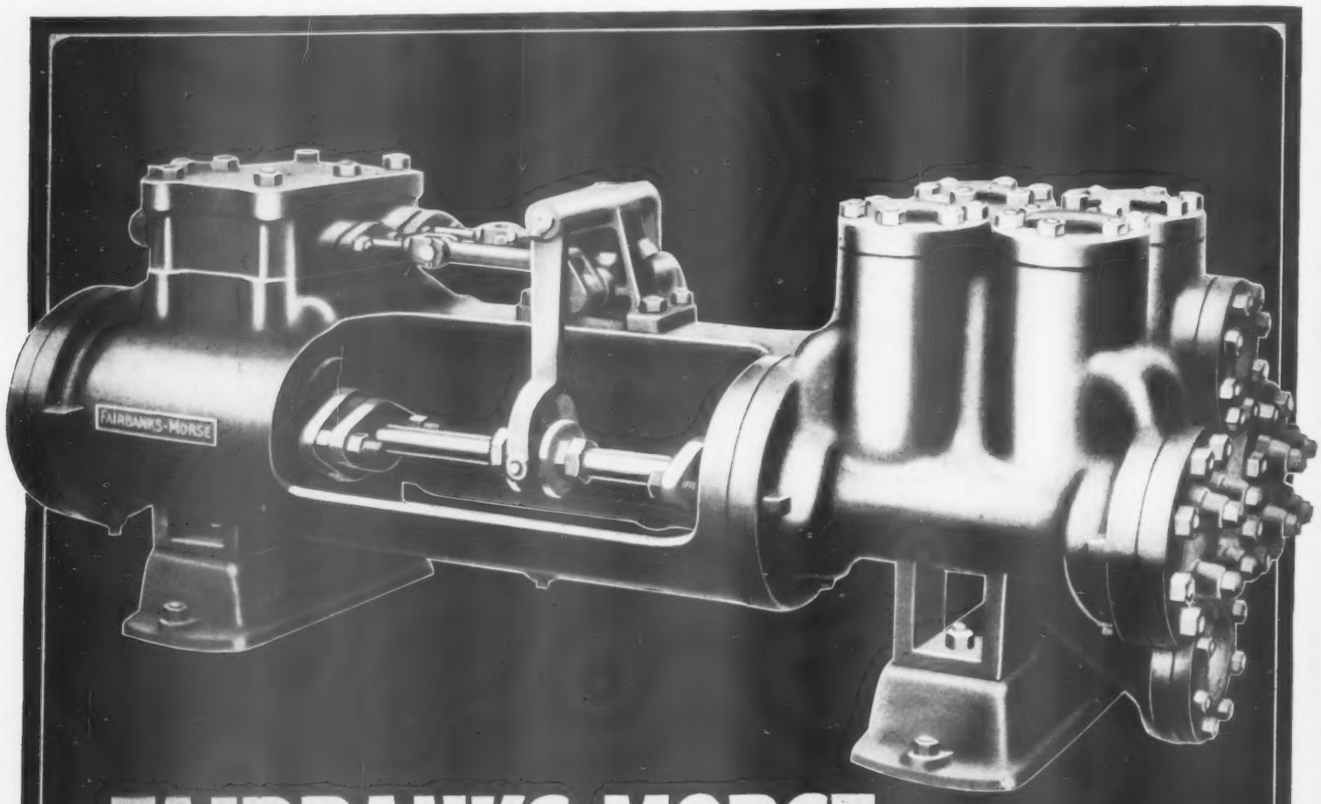
The Allen Welded Pipe Joint is fully protected by letters of patent, all rights reserved. Manufacturers desiring license address communications to—

ALLEN, BLAUNER AND O'DELL

520 MID-CONTINENT BLDG.

TULSA, OKLAHOMA

FOR MODERN PIPE LINES



FAIRBANKS-MORSE OIL FIELD LINE PUMPS

"IF CONTINENTAL SELLS IT THERE IS NO BETTER"

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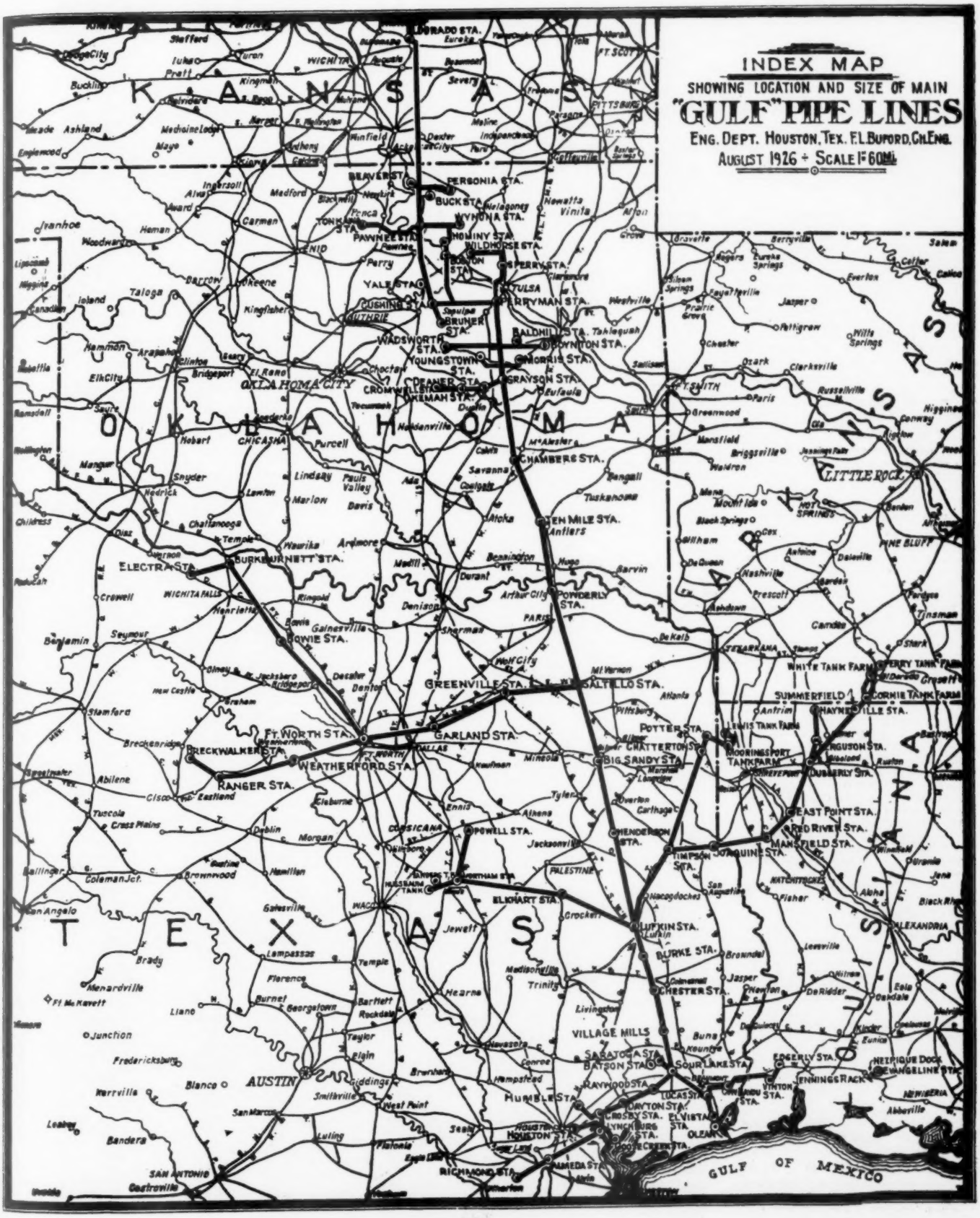
CONTINENTAL


INDEX MAP
SHOWING LOCATION AND SIZE OF MAIN
"GULF" PIPE LINES
ENG. DEPT. HOUSTON, TEX. F.L. BUFORD, CH. ENG.
AUGUST 1926 ÷ SCALE 1" = 60 MI.
KANSAS
OKLAHOMA
TEXAS
ARKANSAS
LOUISIANA
GULF OF MEXICO
OKLAHOMA CITY
AUSTIN
SAN ANTONIO
LITTLE ROCK
ELECTRA STA.
BURK-BURNETT STA.
WICHITA FALLS
BOWIE STA.
FT. WORTH STA.
BRECKENRIDGE STA.
RANGER STA.
WEATHERFORD STA.
GARLAND STA.
GREENVILLE STA.
POWELL STA.
ELKHART STA.
HUMBLE STA.
RICHMOND STA.
SALTILLO STA.
POWDERLY STA.
TEN MILE STA.
CHAMBERS STA.
GRAYSON STA.
MORRIS STA.
BOYNTON STA.
TULSA
BRUNER STA.
YALE STA.
PERRYMAN STA.
BUCK STA.
PERGONIA STA.
BEAVER ST.
ENID
CUSHING STA.
YOUNGSTOWN STA.
WADSWORTH STA.
DEANER STA.
CROMWELL STA.
SEMINOLE STA.
CHICKASHA
MOUNDS STA.
BIG SANDY STA.
POTTER STA.
CHATTERTON STA.
MOORINGSPORT TANK FARM
SUMMERFIELD
CORNIE TANK FARM
HAYNESVILLE STA.
FERGUSON STA.
DUBBERLY STA.
EAST POINT STA.
RED RIVER STA.
MANSFIELD STA.
JOAQUIN STA.
TIMPSON STA.
HENDERSON STA.
LUFKIN STA.
BURKE STA.
CHESTER STA.
VILLAGE MILLS
SARATOGA STA.
BATSON STA.
SOUR LAKE STA.
RAYWOOD STA.
EDGERLY STA.
JENNINGS RACK
NEZPIQUE DOCK
EVANGELINE STA.
ABBEVILLE
LUCAS STA.
CROSBY STA.
LYNCHBURG STA.
EL VISTA STA.
OLEAN
CREOLE STA.
TORYTON STA.
HOUSTON STA.
ALAMEDA STA.
WHITE TANK FARM
PERRY TANK FARM
PINE BLUFF
HOT SPRINGS
DE KALB
MT. VERNON
PARIS
DENISON
DURANT
ARDMORE
DUNCAN
MARLOW
LAWTON
SNYDER
MANGUM
CHILDRESS
VERNON
SEYMOUR
BENJAMIN
STAMFORD
ABILENE
SWEETWATER
COLEMAN JCT.
BRONNWOOD
BALLINGER
SAN ANGELO
BRADY
MENARDVILLE
FT. MCKAVETT
JUNCTION
FREDERICKSBURG
BLANCO
KERRVILLE
BANDERA
LEAKEY
SAN MARCOS
LULING
PLEASANTON
GEORGETOWN
TAYLOR
ELGIN
BASTROP
SMITHVILLE
GIDDINGS
BRENHAM
HEMPSTEAD
WEST POINT
FLORENCE
BURNET
LIANO
LAMPASAS
TEMPLE
HEARNE
MADISONVILLE
TRINITY
LIVINGSTON
JEWETT
GATESVILLE
WACO
MEXIA
PALESTINE
JACKSONVILLE
ATHENS
ENNIS
CORSICANA
DALLAS
MINEOLA
TYLER
KAUFMAN
CARTHAGE
OVERTON
HENDERSON
NACOGDOCHES
SAN AUGUSTINE
KATCHITOCHES
ALEXANDRIA
LEESVILLE
BRONDEL
JASPER
NEWTON
DE RIDDER
ORANGE
BEAUMONT
PORT ARTHUR
GALVESTON
TEXAS CITY
ALVIN
PEARLAND
ANGLETON
VICTORIA
GONZALES
CUERO
YOAKUM
HALLETTSVILLE
EAGLE LAKE
EL CAMPO
WHARTON
EAGLE LAKE
RICHMOND
ROSENBERG
SEALY
BELLVILLE
BRENHAM
HEMPSTEAD
NAVASOTA
BRYAN
COLLEGE STATION
CALDWELL
LEXINGTON
ELGIN
TAYLOR
ROUND ROCK
GEORGETOWN
BARTLETT
ROCKDALE
CAMERON
MILANO
THORNDALE
MARLIN
WACO
ROBINSON
CROSS PLAINS
DUBLIN
MORGAN
EASTLAND
CISCO
TUSCOLA
ABILENE
SWEETWATER
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MENARDVILLE
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BLANCO
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BANDERA
LEAKEY
SAN MARCOS
LULING
PLEASANTON
SAN ANTONIO
CASTROVILLE
UVALDE
HONDO
D'HANIS
MEDINA
BANDERA
KERRVILLE
BOERNE
NEW BRAUNFELS
SEGUIN
GONZALES
CUERO
YOAKUM
HALLETTSVILLE
EAGLE LAKE
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WHARTON
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TUSCOLA
ABILENE
SWEETWATER
COLEMAN JCT.
BRONNWOOD
BALLINGER
SAN ANGELO

Texas Fields Required Big Pipelines

Spindletop Pool Responsible for the Organization of The Texas Company and the Gulf. Early History Interesting.

By P. L. McGreal

The history of pipeline transportation of crude oil in Texas dates back to 1897, the first line being in the Corsicana Field and known as the J. S. Cullinan Pipe Line Co. It was a short line extending from the field east of Corsicana to the town, connecting with loading racks on the railroad. Later a refinery was erected at Corsicana. In the 29 years that have elapsed pipeline transportation has grown from what would now be considered a rather insignificant line to approximately 20,000 miles of trunk and gathering lines. The capital invested in lines, tanks, pumping stations and sites in Texas represents over $200,000,000.

The pipeline side of the industry is constantly growing as new fields are developed. It is difficult to picture the helplessness of the petroleum industry without pipeline transportation. Operators in new fields, who are compelled to ship out their product in tank cars and contend with all the vexations connected with railroad transportation, fully appreciate the value of pipelines.

First Line Handled 3,000 Bbls.

The first line handled between 3,000 and 4,000 bbls. per day when the old Corsicana Field was at its peak. Now approximately 350,000 bbls. per day finds its way to the refineries and terminals on the Texas Coast through the trunk lines of The Texas Company, Gulf, Humble Pipeline Co., Magnolia Petroleum, Sinclair and the Prairie Pipe Line Co., formerly the Pure Oil Pipe Line Co. This vast quantity of crude originates in the Kansas, Oklahoma, Arkansas, Louisiana and Texas Fields. The Standard Oil Co. of Louisiana handles around 75,000 bbls. per day to its Baton Rouge, La., refinery. In addition heavy deliveries are sent north from Texas by the Prairie, Sinclair and other lines.

The personnel of the pioneer pipeline organization from 1897 to 1901 was as follows: J. S. Cullinan, president and general manager; W. T. Cushing, superintendent of the pipeline; E. R. Brown, superintendent of the refinery. Mr. Brown is now the chairman of the board of directors of the Magnolia Petroleum Co. Mr. Cullinan is the head of diversified oil interests and Mr. Cushing is the representative of the Dearborn Chemical Co. in the Southwest.

The J. S. Cullinan Pipe Line Co. owed its existence to the development of a light oil in the Corsicana section in 1895. As in so many cases oil was discovered while drilling for water. The discovery caused very little excitement, owing to its isolation from producing territory, which at that time was confined to Pennsylvania, West Virginia and Ohio. The Southwestern Oil Co. was organized by Corsicana residents, composed of Messrs. Garrity, Mills and Scales. Mr. Mills was then United States Senator from Texas and Mr. Scales was a large cotton factor. The Southwestern Oil Co. operated in an indifferent manner, having no market for its production except a few concerns in Dallas and Waco and others scattered through north Texas which used it for fuel.

Organized Pipeline

Production continued to accumulate and something had to be done. J. S. Cullinan, president of the Petroleum Iron Works, then located at Washington, Pa., was consulted. Mr. Cullinan came to Corsicana and investigated the situation and secured contracts to store production up to 5,000 bbls. per day, a figure the field never reached. He returned East and interested capital and organized the J. S. Cullinan Pipe Line Co.—the first in Texas, or west of the Mississippi River for that matter. The old Forest Oil Co. had a short line in the Neodesha, Kans., Field about this time. Steel storage tanks and loading racks were built. Operators commenced a town lot drilling campaign that soon ran the production to an average of 4,000 bbls. per day. Soon thereafter a heavy gravity district was opened at Powell and the next step was the construction of a refinery with a capacity of 2,500 bbls. per day. The output of the plant was marketed through the Waters-Pierce Oil Co. of St. Louis, which at that time dominated the entire area west of the Mississippi as distributors of refinery products, extending from the Canadian boundary to the Gulf of Mexico.

About this time T. J. Donoghue and W. C. Proctor became associated with the J. S. Cullinan organization. Mr. Donoghue is now the first vice president of The Texas Company and Mr. Proctor is the treasurer of the Magnolia Petroleum Co.

Mr. Cullinan severed his connection with the company in 1901, which eventually, through a succession of changes, became what is now known as the Magnolia Petroleum Co.

Gulf Coast Next

The famous Spindletop Pool, 3 miles from Beaumont, Jefferson County, in the Coastal Plains region of Texas, was opened in January, 1901. The call for pipelines and storage was urgent and but little time was lost in supplying both. Guffey and Galey, widely-known wildcatters in their day, furnished the money to drill the "Lucas gusher" as the discovery well at Spindletop is called in oil history.

And here is a bit of unwritten history: Guffey and Galey appealed to the Standard Oil Co. to take the oil. A party of Standard Oil Co. officials, headed by the late Daniel O'Day, president of the National Transit Pipe Lines and subsidiary companies, and C. N. Payne, general manager, and accompanied by J. S. Cullinan and the late P. C. Boyle, publisher and editor of the Oil City (Pa.) Derrick, visited Spindletop and viewed the gushers. Mr. O'Day remarked: "Too big, too big; more oil here than will supply the world for the next century—not for us," and the party departed. Nor can Mr. O'Day be censured for his lack of vision. The oil was heavy gravity and little was known about that character of crude in those days. The gasoline engine was unknown and gasoline considered a useless by-product. The lubricating demand was limited. Introducing oil as a fuel in competition with coal involved the expenditure of vast sums of money. Small wonder that Mr. O'Day and his companions turned their backs on Spindletop.

J. M. Guffey then turned to the Mellon brothers, of Pittsburgh, heads of an old and successful banking house. The Mellons advanced capital to lay a line from Spindletop to tidewater at Port Arthur, 20 miles south. The line was started in March, 1902, and completed shortly afterward. It marked the second epoch in pipeline construction in Texas. Other lines followed to Sabine Pass on the Gulf of Mexico. The Pews, who control the Sun Oil Co., laid the Sun Pipe Line, the National Oil & Pipe Line Co., with Underwood Nazro, now first vice president of the Gulf allied companies, as manager followed and the Burt Refinery Co.'s line. The latter eventually became part of the Magnolia Petroleum Co.'s properties.

Terminals Constructed

Terminals were erected at Port Arthur and Sabine Pass and the crude shipped to Atlantic Coast refineries and for the fuel markets.

When the Standard Oil Co. officials gestured "thumbs down" on Spindletop, J. S. Cullinan interested John W. Gates, who was then in the heydey of his career as a capitalist. Mr. Gates responded. A line was laid to Port Arthur with gathering lines in the pool, thus making the second pipeline to Port Arthur. Later the present The Texas Company was organized with Mr. Cullinan as president and he remained as the executive until 1913, when he retired to operate independently and open the deep sand at Humble.

Thus two of the largest pipeline companies in the country—The Texas and the Gulf—originated during the boom at Spindletop. Throughout the intervening years they have been important factors in the transportation of crude in the southwestern fields. Both lines expanded with the development of the Sour Lake, Saratoga, Batson, Humble and Jennings Pools and built into the Shreveport section of Louisiana.

In 1906-07 both these companies extended their facilities into the Glenn Pool in Oklahoma, where overproduction had resulted in cheap crude. The Gulf Pipe Line Co. laid an 8-inch line from Sour Lake to the Glenn Pool, taking an air line course. The Texas Company laid an 8-inch line from West Tulsa to Humble, Tex., via Dallas, at which point a refinery was erected for the distribution of its products in north and west Texas. A 6-inch line from West Tulsa to Bartlesville followed the acquisition of producing properties around Bartlesville.

The J. S. Cullinan Pipe Line Co. had erected steel storage at Sabine Pass in 1899 to provide coastwise shipment of Corsicana crude in tankers. These tanks were not used until March, 1902, when the tanker Atlas, of the Standard Oil Co. fleet, was loaded with Spindletop crude. It was the first tanker to leave a Texas port and marked another pioneer movement in the transportation of crude from Gulf Ports.

Magnolia's Pipeline

The Magnolia Petroleum Co. laid its 8-inch trunk line from southern Oklahoma to its Beaumont refinery in 1911-12, with a capacity of 20,000 bbls. per day. D. C. Stewart, a pioneer pipeline man from the Pennsylvania and West Virginia and southeast Ohio fields, was the general manager and is still the chief executive. The line has been increased by means of duplicates and long loops until it now has a capacity of 100,000 bbls. per day. During the Luling boom in 1923 the company laid 180 miles of 8 inch welded line from Luling east to Beaumont. It was the first welded oil line of any distance in the country. The company is now laying a 180-mile extension southwest from Luling into the Mirando-Laredo Pools.

The Humble Pipe Line Co.'s system has had the quickest and most wide expansion of any of the major lines in the Southwest. It was started during the Ranger boom in 1918, extending from Comyn, Eastland County, to the Gulf Coast, as an 8-inch line. In the coastal region 8-inch lines were laid to West Columbia and Pierce Junction. The company early entered the Mexia and Powell Fields, laying lines to connect with its trunk system at Hearne. The trunk line from Hearne to Webster increased in capacity from the original 20,000 bbls. per day to 100,000 bbls. Last year 135 miles extension was laid from Comyn west to the new Big Lake Field in Regan County and this year the company laid 110 miles of 8-inch pipe from the Duval-Jim Hogg County fields eastward to seaboard at Ingleside, near Corpus Christi. R. V. Hanrahan, a young man with vision and aggressiveness, is president of the Humble Pipe Line Co. and has surrounded himself with a capable staff of assistants. The company is completing 45 miles of 8-inch line from Hull east to the new deep sand section at Spindletop. The company has a line from Baytown refinery to Hull Pool and Orange Pool.

First Sinclair Line

The first line of the Sinclair Pipe Line Co. in the coastal region was laid from the refinery on the Houston Ship Channel to the Damon Mound Pool in the northwestern part of Brazoria County, a distance of 56 miles. The com-

(Continued on Page C-157)

RECEIVING MANIFOLD OF PIPELINE COMPANY

Stop the ravaging march of that relentless enemy—corrosion!

ATERITE resists this destructive force!

Every day more and more chemical engineers in charge of industrial plants are coming to realize that corrosion is shortening the life of apparatus, cutting down production, and reducing profits to such an extent that it has become a serious menace to industry.

The installation and replacement costs due to corrosion are actually appalling—but ATERITE is waging a battle on corrosion that is attracting nation-wide attention.

ATERITE is a patented, non-corrosive, acid-resisting, metallic alloy. It has proved itself one of the most effective weapons to keep down the ravages of chemicals.

ATERITE has been successfully used for years and has withstood corrosion which had always been accepted as a necessary evil. ATERITE Valves and Fittings are highly valued today throughout many industries because of their resistance to the corrosive action of a wide variety of acids, bases, salts, organic compounds, mixtures and colors.

Varying conditions in industries where acid and other chemical problems exist have resulted in different grades of ATERITE. The proportion of base metals in each grade is different and properly balanced to produce satisfactory results for each particular purpose.

We will gladly co-operate with you to determine which grade of ATERITE is best suited for your particular use. We will also send you an interesting book showing the results of tests made to demonstrate the strength, ductility, torsion, density and other valuable qualities of ATERITE. Write us today.

Cast Aterite is recommended for these chemicals

ACIDS:

Acetic	Fatty	Pyrogallic
Arsenious	Formic	Salicylic
Boric	Hydrofluoric	Sulphurous
Carbolic	Hydrofluosilicic	Tannic
Citric	Lactic	Tartaric
	Oelic	

Sulphuric—Cold—of any degree Baume, including Fuming.
Sulphuric—Hot—up to 60° Baume, any temperature up to 150° F.
Sulphuric—Hot—60° to 66° Baume, any temperature up to 225° F.

BASES:

Calcium Hydrate — Caustic Soda — Caustic Potash

SALTS:

Aluminum Chloride	Ammonium Sulphate	Lead Acetate
Aluminum Sulphate*	Barium Chloride	Nickel Sulphate
Ammonium Bromide	Barium Sulphate	Sodium Citrate
Ammonium Carbonate	Calcium Chloride	Sodium Hypochlorite
Ammonium Citrate	Cilcium Citrate	Sodium Formate
Ammonium Oxalate	Calcium Sulphate	Sodium Phosphate
Ammonium Phosphate	Copper Sulphate	Sodium Sulphate

*(*For Aluminum Sulphate, specify No. 136 Aterite).*

ORGANIC COMPOUNDS:

Acetone	Chloroform	Formaldehyde
Benzol	Collodion	Glycerine
Carbon Tetra-chloride	Ethyl Alcohol	Methyl Alcohol
	Ether	Phenol

MIXTURES:

Mine Water — Tannic and Sulphuric Acids

COLORS:

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Standard Aterite Gate Valves—all parts actually in contact with the liquid handled are of Cast Aterite — are furnished with screwed in bonnets in sizes ¾", 1", 1½". With outside screw and yoke bolted bonnets in 2", 3", 4", 6" sizes.

Aterite Extra-Heavy Cocks, particularly adapted for lines carrying Sulphuric Acid, are constructed entirely of Cast Aterite, in sizes ½", ¾", 1", 1½", 2", 3".

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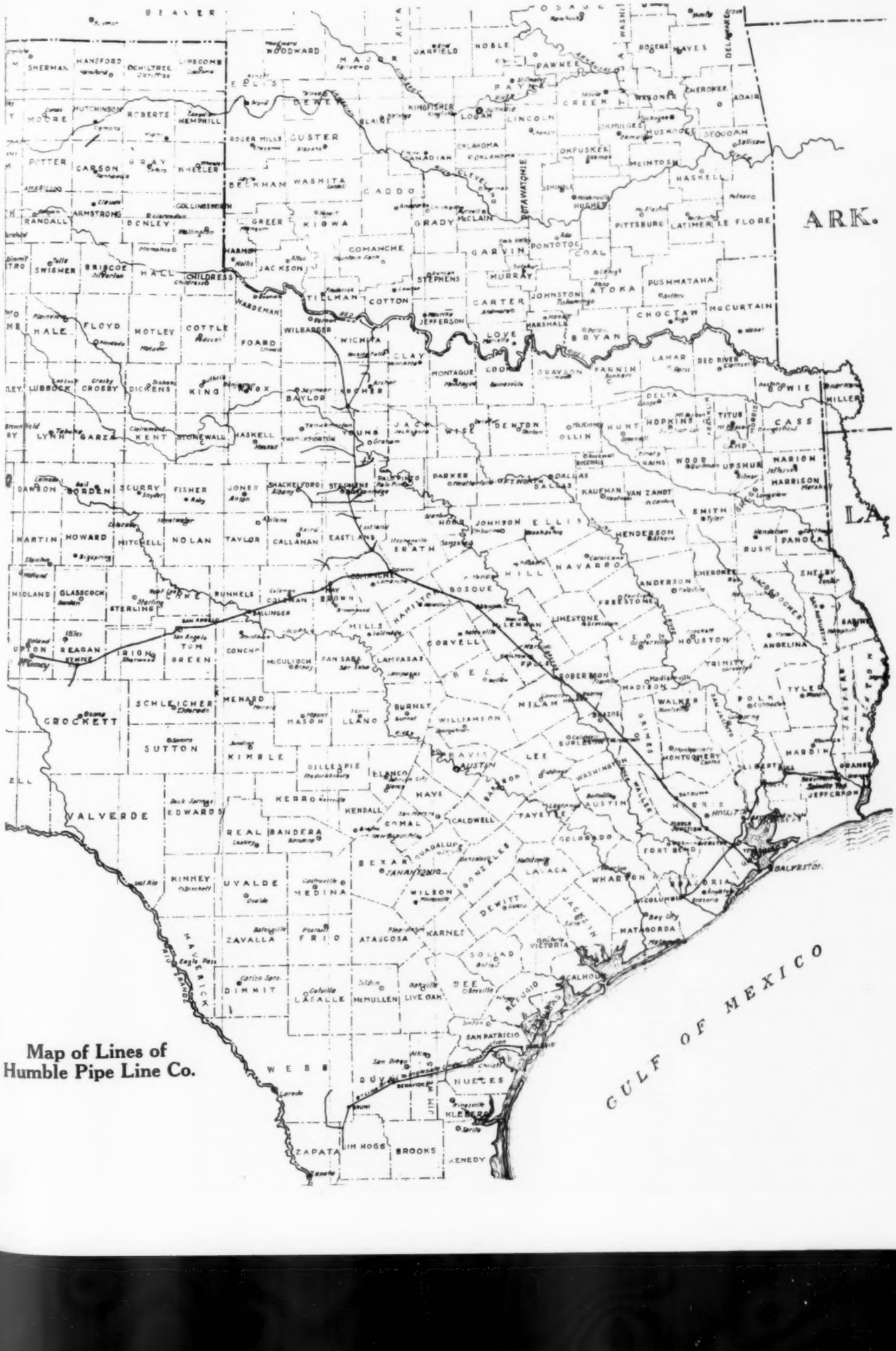

Map of Lines of Humble Pipe Line Co.

Slack Problem in Welded Pipelines

Necessity of Wide Trenches and Flat Bottoms in Pipe Laying is Questioned. Figuring Slack in Inches Per Mile

By L. A. Kelly
Kelly, Dempsey & Co., Tulsa, Okla.

In the following article it is not the desire, nor is it the purpose of the writer to advance figures, theory or practice as irrefutable, but rather to show the results of study made over several years in the successful construction of welded pipelines.

Limited information does not disclose any previous attempt to advance a rule whereby "slack" may be figured to a matter of inches per mile. An attempt to form such a base and prove that contention will be included in this article.

In the curriculum of pipeline vocabulary appears the word "slack," which is not a new word in general application, but rather a new application to an old.

Webster defines "slack" as "relaxed or loose—as rope, etc., lying loose"; which is rather hard to apply to the meaning desired in its incorporation as the proper term describing excess pipe displacement.

Applicable to pipelines, we might define "slack" as the excess amount of pipe inductive to a continuous line.

While "slack" has created a subject of many different opinions among students of welding, yet the purpose is without argument. For convenience we will divide the argumentative points under the following subject heads:

(1) Purpose. (2) How attained. (3) Amount necessary. (4) Distribution.

Purpose of Slack

"Man proposes, nature disposes," is peculiarly true of construction in welded pipelines. Past experiences are convincing of "nature's disposition" in man's paltry attempts to violate forces which are here.

Contraction and expansion, nature's power giants, are not to be harnessed by man's proposal. In tests of strength, man's portion is failure. So, in pipeline construction, man has resorted to pacification in order to overcome contraction. To pacify contraction by distributing an adequate excess over the variable area, thus nullifying line strains, is the purpose of "slack."

However, in appeasing contraction, it is evident that the expansion element has been correspondingly increased. At first thought, this provides a danger point, but, happily, in general practice this "bug" appears to be right at home without evincing disrupting force.

It is evident that where only the proper amount of slack has been provided, expansion finds its own outlet without detriment to bends or welds.

How Attained

The following is the practice generally used in apportioning and holding slack during construction:

Long sections of pipe are placed over the ditch, on skids. After the welding is completed, the lowering crew remove the skids and lower pipe to the bottom of the trench. At designated intervals the supports are left across the ditch, which causes pipe to form an "arch" over the skids, and again continuing on, the pipe is lowered.

These arches are termed "slack loops" and hold a definite amount of slack in reserve, which is not lowered until the work has progressed to a point in advance sufficiently far that the resistance will not permit the excess to creep forward and escape.

The "crotch" is sometimes used in conjunction with slack skids, crotches placed one on each side near a point where pipe is half way out of the trench. The purpose of this is to distribute the weight over the arch.

In the small diameters, the crotch is rarely used, as the weight is not sufficient to bend the pipe, strain the welds or break the skids, but in the large size, crotches are necessary.

To attain slack is easy, but to hold it to the radius desired requires careful preparation and study.

Amount Necessary

The question of how much slack is necessary is often asked by those interested in pipeline construction. The answer has always been evasive, with no definite amount suggested.

The practice has been along certain specifications as issued by one of the large constructors, in which the argument was: "Amount necessary an unknown factor for safety, force in all that the ditch will absorb," and as the regular ditch common to screw and sleeve lines would not absorb the quantity desired, these specifications called for a trench twice the diameter of the pipe.

To accommodate this surplus, the pipe was "snaked" from side to side of the trench, which also required that the bottom be flat.

It is the intention of this paper to question the absolute necessity of wide trenches and flat bottoms in successful pipe laying.

Double-width trenches have served a very good purpose inasmuch as skepticism and doubt were the means of delaying the advent of welded lines. Contraction, as an unknown equation, had to be overcome, and wide trenches have been and are confidently accepted as counter-action.

If the successful construction attending the use of the wide trench is proof of its correctness, then the same argument is advanced that just as many successful projects have been placed in normal trenches. If the first suggestion had been for a trench three times the diameter, there would have been no available argument other than it did not appear necessary, but the exceptionally high costs would have been sufficient to discredit it.

Perhaps the added costs are not burdensome on small diameters, but consider a construction of 16 to 20-inch pipe which would demand a 32 to 40-inch trench.

Progress Demands Economy

Progress demands economy, which in turn requires that excess be eliminated, pipelines and if wide trenches are superfluous, then they are the means of unnecessary costs.

Width may be of benefit during the excessive heat of summer, or as a means of eliminating close supervision, but the contention herein is that a trench which is wide enough to receive sleeve construction is sufficient for welded lines.

A line of pipe, in a wide trench, which is snaked from wall to wall, has the semblance of an abundant amount of "slack". However, in meeting the requirement of contraction, the "push" is limited to the radius or point at which the line would be dormant, with further contraction developing a "pull", or line strains.

The wide trench permits the pipe to traverse from wall to wall in long "swells", while a normal ditch will force the pipe in like manner, but with short snappy variations. These may be compared to a long and short auto spring in which the driving force of the smaller loop is manifest almost to a point of normalcy, while the larger, longer, ceases to function after the release of a portion of the tension due to the absorbtion of the long section and the resistance of a greater area of backfill.

If this application is correct, then it is evident that the short loops are on guard under higher tension and will function beyond the longer ones, in which case a normal trench would appear as preferable.

Engineers who champion wide trenches readily agree that during construction in cold weather it is desirable to lessen the amount of slack, and consequently the loop radius, which is an admission that double width is at times, out of season.

Authentic tests have revealed that the movement of pipe at point of loop is barely perceptible during extreme changes, proving that a very small percentage of slack is called into play.

In following these opinions one would surmise that a narrow trench which would not permit snaking would be taboo, yet experience proves otherwise, as properly handled and distributed, "slack" herein is most effective, combining the elements tension and gravity.

The same procedure of forcing slack within the trench is used with approximately the same amount of slack loops. As lowering of loops proceeds, there will occur at intervals a loop which will not go within the limits of the trench; then at points on each side of this loop the pipe is to be raised in a series of small arches, which will be held in position by the "push" exerted one on the other.

It may become necessary, in heavy pipe, to pass a chain under pipe and over skid on a small percentage of these loops, to assist in retaining the arch at a desired point. The pipe will then have the position of being snaked vertically in these arches which will combine the tension and weight in overcoming contraction.

Naturally this method demands close attention and supervision with temperature and topography as major factors and will be found very effective especially in pipe of large diameters.

The following tables and arguments are not to be confused as an attempt to state how much slack a trench will absorb, but how much is necessary to overcome contraction, plus amount desired as surplus.

The total expansion or contraction for wrought iron pipe is: each 100 feet every 100 degrees Fahrenheit equal 0.805 inches; or in 5,280 feet, 100 degrees change equals 42.5 inches.

For mild steel pipe: each 100 feet every 100 degree change equal 0.78 inches; or in 5,280 feet every 100 degree change 41.2 inches. Reducing this we find each 10 degree change registers 4.12 inches per mile or 0.412 for each degree change.

In computing slack necessary we have the following factors to consider. (1) Rate of expansion, (2) Temperature Fahrenheit at time of lowering slack loops, (3) Extreme low degree to which line may be subjected in service.

(1) Rate of expansion; being the change in inches during change in temperature over a definite footage.

(2) Temperature at time of lowering slack loops represents extreme high temperature i. e., which temperature may reach a higher point in service the contraction and expansion elements are dormant, which if called into play will each offset the other.

(3) Extreme low temperature; being the low degree to which line may be subjected during service or low point at which contraction or expansion may occur.

Depth of trench, soil composition and local temperature extremes have a divided influence as to service temperature.

Example: On tests conducted by the Bureau of Mines with a 6-inch gas line buried to a depth of 18 inches in Kansas, the extreme to which the line was subjected during a period of one year was, high 80 degrees Fahrenheit and low 35 degrees Fahrenheit.

Assuming that the line was placed in the ditch at a temperature of 65 degrees Fahrenheit with extreme low of 35 degrees Fahrenheit we have a service range of 30 degrees Fahrenheit which applied to rate of expansion per contraction per mile of 41.2 inches, we have 30-100 of 41.2 or 12.36 of contraction to be provided for.

Now if a line had an extreme low of 40 degrees and was placed in the ditch at 40 degrees it is evident that expansion and contraction would be equal, and the absolute necessity of additional slack questionable, but safety demands that always must there be a reasonable surplus existing, and that surplus must be upward of 100 per cent.

A surplus of 100 per cent in the above application would require a total of 24.72 inches per mile. Then it becomes necessary to arrive at a method and figure of knowing just when this amount has been secured.

The method previously described in obtaining and distributing slack readily provides the means of figuring amount deposited within a given area. As these slack loops hold a specific amount in reserve and are not apparent until loops are lowered, then it becomes necessary to ascertain the amount so held.

Depth of ditch and clearance of arch are the factors which specify the amount, size and flexibility of pipe with depth control the arch, the practical application of which is reduced to the following table—(8 inch pipe):

Arch.	Depth.	Inches
100	24	1⅞
120	30	2¼
160	36	3⅛

Now in the above example, we have a line which demands 24.72 inches, let us presume the 24 inch trench, which, then will require 18 slack loops per mile—30 inch trench requires 11.

Each locality presents different problems as to temperature, soil and topography, and proper consideration of these with depth and other minor conditions will enable one to arrive at the amount necessary and desired.

Distribution

Distribution is vital to the success of the line as is sufficient slack, for that reason proper care must be given to the points demanded by the togography of the right of way, as every broken contour automatically furnishes slack.

For this reason, each section of line must be assigned the amount of loops which may be absorbed, and not a specified number to be placed per mile throughout the whole line.

Standard practice today becomes obsolete tomorrow and the future methods will, as they arrive, insure construction more economical and enduring.

SPEED IS THE POINT

The constantly shifting scenes of activity, one field declining and another opening hundreds of miles away adds to the cost of pipeline construction. Mechanical equipment and pipe must be assembled on short notice, distributed along the right of way despite adverse weather conditions and pumping stations erected. To meet these conditions each of the major pipeline corporations has a highly specialized staff, each of whom takes charge of his particular part of the work and carries it on to completion within a specified time. Manufacturers of pumps, engines, steel tanks and pipe mills coordinate with these staffs, shipments being so timed as to be at designated points on the proposed line on specified dates.

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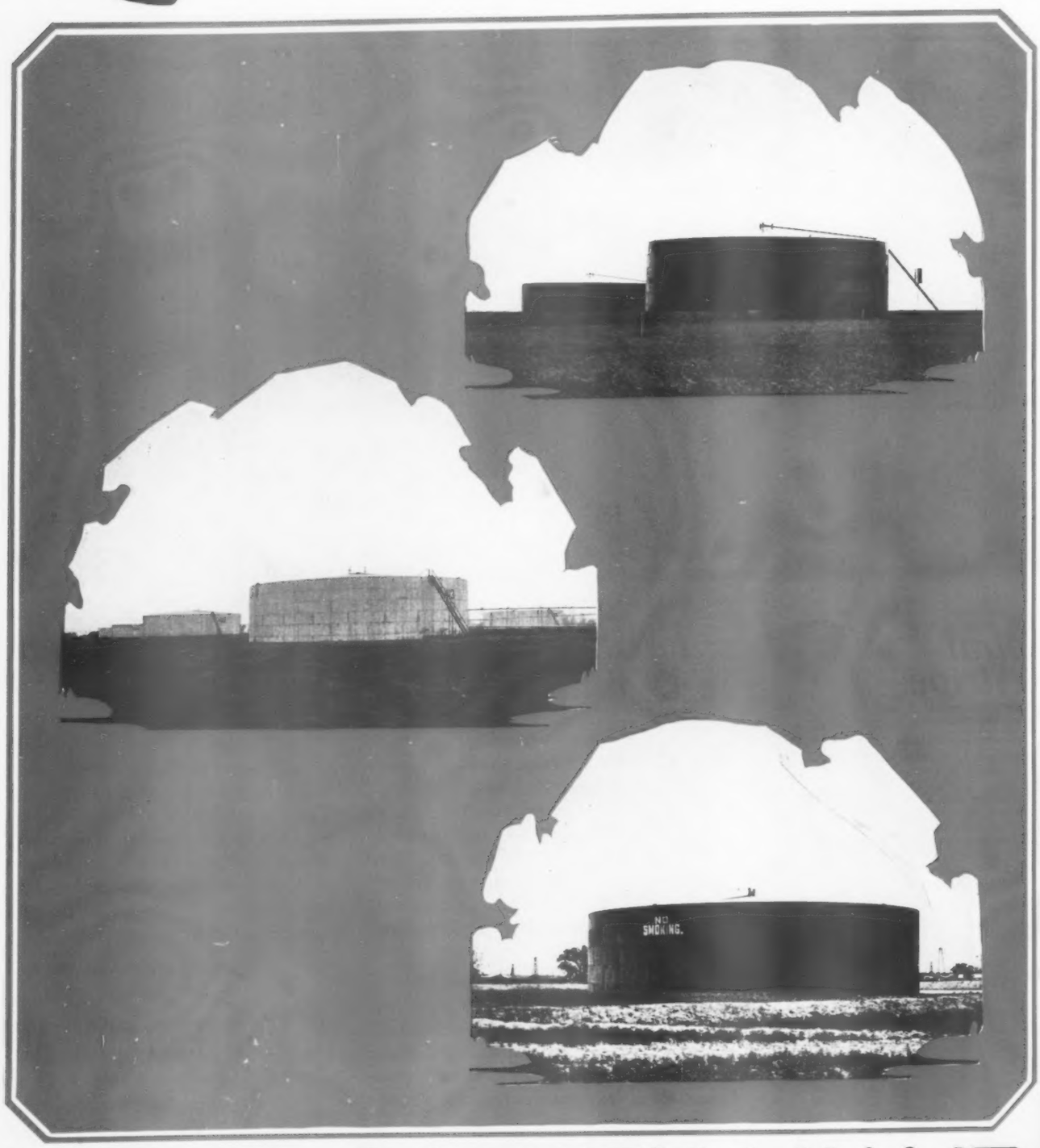

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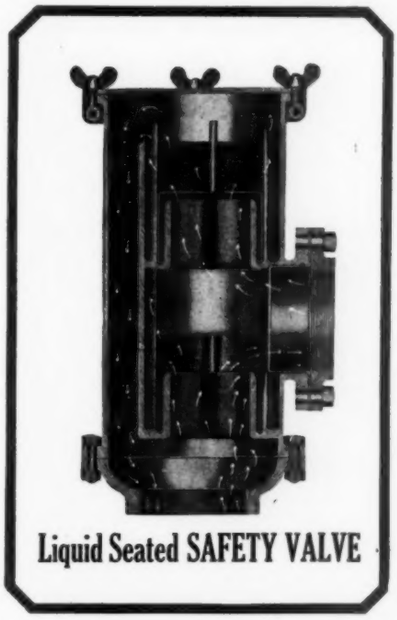

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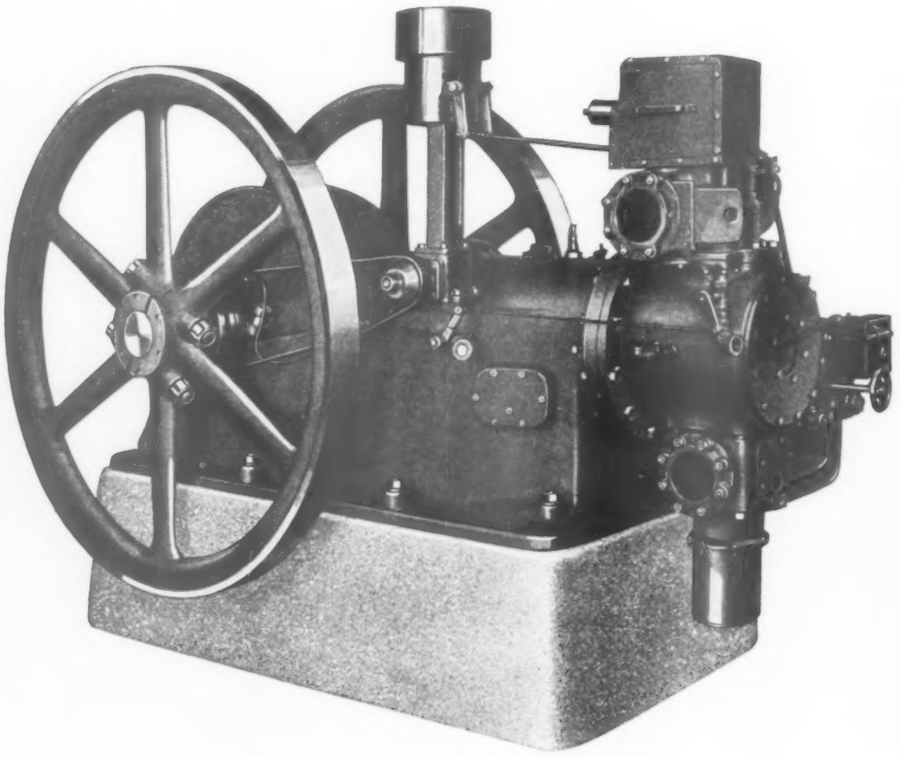

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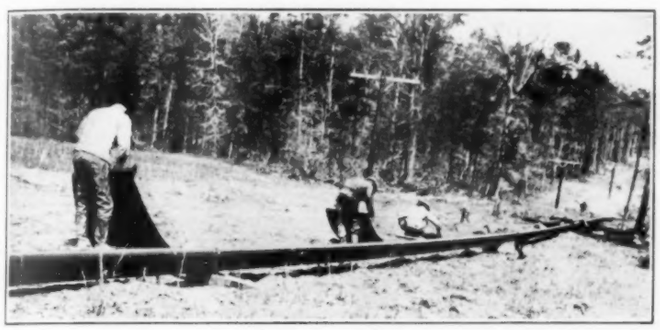
Gas Engines Used on Magnolia's Line

Difficult Feat of Laying 257 Miles 40-Foot Length Pipe Through Swamps and Across Rivers About Completed

By James H. Dameron

The Louisiana-Arkansas district seems to have a penchant for going strong in doing things on a Cyclopean scale so far as the petroleum industry is concerned. There is the mighty Smackover Field which has established a productive record any operator there can boast of with pardonable pride. Then there is the world's largest gas field in Monroe, and the swamps and attendant obstacles that pipeliners have to overcome. That penchant for massiveness extends to the pipeline departments of the industry and the trunk systems as a whole rank with those of any other section of the oil producing country, and can lay claim to several firsts.

The latest distinction to be added to the trunk systems in the district was



Wrapping Magnolia line with asphalt felt

made by the Magnolia Pipe Line Co. when it built its welded line from El Dorado, Ark., to Beaumont, Tex., a distance of 257 miles. The long artery feeds the Magnolia's Beaumont refinery. It is an 8-inch welded carrier, constructed under difficult weather conditions and in its construction are embodied several new features to this territory and one interesting to all pipeliners, that of using double length, 40-foot pipe instead of 20-foot pipe.

Although the pipe was extremely difficult to handle in the swamps and woods it nevertheless played an important role in the rapid completion of a line built under adverse weather conditions. Laying of the line was started February 18 and the first 108 miles was completed and oil going through it on April 23. By June 6 all of the line was completed and crude going through.

Parallels Gas Line

Because of an economic condition foreign to other long lines the Magnolia will probably establish a low operation cost record for great trunk systems. The oil trunk runs parallel to the Magnolia's 18-inch gas line from Sarepta, La., to Beaumont and the pump stations are equipped with gas engines which draw their fuel from the gas line.

Building of the line marked the first big effort of the Magnolia to use Smackover and Louisiana crude. It can now handle Smackover, El Dorado, Caddo, Bull Bayou, Haynesville and Homer crudes.

The Magnolia's is the shortest and straightest cut from the point of origin to its destination so far as is possible. Three large rivers are crossed by the line, the Red in Louisiana and the Sabine and Neches in Texas. Miles of swampy country, numerous small streams and stretches of wooded sections are in the path of the right of way. Only a comparatively few miles of the line goes through open and high ground.

C. R. Swank was sent from the Beaumont division to superintend the construction of the northern end of the carrier as superintendent of the Louisiana-Arkansas division and "Mike" Murpuy, another veteran pipeliner, had charge of building the southern end from a point north of Latex Station, in Texas, to Beaumont. His end was sprinkled with as many obstacles as the northern end and he had two river crossings to make.

Trained Crews of Welders

Before welding of the carrier was started crews of welders were trained in the Beaumont shops. This was done to insure a more uniform job of welding all along the line.

During the summer months swamps are comparatively easy to cross with lines. But during the winter and spring months when rainfall is more or less heavy, pipeliners have numerous reasons for wanting to stay out of the swamps. They are cold and muddy and difficult to work in. In addition the dense growth in the swamps is harder to clear off the right of way.

Because the construction work was started in February the crews were compelled to work in some of the most severe weather of the year in this district. Cold and heavy rains filled the streams and bayous and flooded the lowlands, adding to the general discomfort of the crews. Many were the days the welders had to "knock off" because of heavy downpours and frequently their work was interrupted by spasmodic showers. Sticky gumbo clung to the workmen working in the seas of mud and freighted them down. Working in the cold water chilled but it was only another unpleasant task in getting the line through. Despite the many inducements to illness only a minimum of illness was reported in camp because the pipeline gangs are usually a hardy lot.

Ditching for the line with modern machinery on the northern end was impracticable and in most places impossible. That part of the job was let by contract and all of the 18-inch trench was dug by laborers. Machines were shipped there by contractors but they were never taken into the densely wooded and swampy country. Practically all of the back filling was done by laborers.

Made Own Devices

Where sections were under water the ditchers passed on to higher country and returned to the lower section later to bury the pipe when the water receded. Some back filling was done with mules and scrapers. The caterpillar tractors equipped with cat heads aided in some of the back filling. Makeshift scrapers were made of heavy boards and plow shares attached. A line was attached to the scraper and to the cat head. The scraper was pulled behind the dirt and the load jerked into the ditch with the cat head.

Decision of Magnolia pipeline officials to use double length pipe brought more transportation problems, especially through densely wooded sections and through sticky gumbo areas. The pipe was shipped by rail to the nearest point and loaded on trucks and carried in as far as good roads would permit. Four-mule or horse teams picked it up from there and carried it to as near the right of way as they could go.

Each joint of pipe weighs around 1,200 pounds and two joints of it was a good load for a four-mule team. When the teams could not get the pipe all the way in tractors and the ancient but reliable oxen took up the load and brought it in. The length of the pipe required skill on the part of drivers to "snake" their load through the woods. A great amount of pipe was "snaked" through the swamps by oxen, sometimes because the tractors were needed elsewhere and sometimes because the mud was too tracherous even for the tractors. The oxen pulling through mud that hid their flanks, "snaked" the load through apparently as easy as if they were walking through a meadow, while the driver exerted himself in cracking a long whip and indulging in that language that oxen apparently understand.

Welding the Line

Getting the double length pipe to the right of way did not end the trouble. It had to be handled there and under difficult conditions. The use of such pipe on long lines was new and A. J. Powers, of the National Tube Co., stayed on the line until the northern end was built to inspect the pipe and report on it. It is, of course made laying the line twice as rapid and the pipe thus far has proved satisfactory.

The worst stretch of laying was from Sarepta to the Red River through sections which were more or less under water at that time of the year, or in sections

Welding equipment being hauled on mud sled by tractor

where there were literally shallow lakes of mud. Caterpillar tractors were employed to pull the welded equipment. They splashed and rocked their way through that country dragging their load on mud sleds. The line through there was welded and later buried.

Usually two crews of welders worked from a half to 1 mile ahead of the tying in gang. From 5 to 10 joints of pipe were placed on blocks, and leveled. Clamps were fastened on the short string and the welders "tacked" the pipe together and then removed the clamps.

Starting together the welders would weld a quarter of the way around the pipe towards the top and then give the string a quarter turn. All of the welders usually finished their quarter weld at the same time. In this manner the joints were welded uniformly. Caution was used to avoid pin holes in the welds. The welded section was rolled off the blocks and another section placed on. Finishing at that location the welders moved their generator farther down the line and started welding other sections.

Tying-in Was Difficult

Sections of the pipe were plugged and dragged to their place on the right of way and the bell hole welders did the tying-in. They also did all of the bending. Theirs was the most difficult task of the welders because they could not roll their pipe but had to start at the bottom and work around it. Especially was theirs a nasty job when they were forced to lie on their backs in mud to make the weld at the bottom.

In making up river crossings, sections to go across swamps and bayous, the pipe was mounted on a long string of blocks and welded. For the swamp crossing, the line was plugged and tied on the tractors which clumsily burrowed their way through to the opposite side of the swamp. Two lines cross each of the three rivers and 1,000-pound river clamps were clamped over the welds of the pipe going into the rivers.

To have the line in operation by June 6 required feverish haste during the last week of its construction. As the work on the northern end of the line was nearing completion the work on the southern end was well under way. During that last week six and seven crews were working both day and night.

For protection against corrosion and rust each joint of the pipe was given two coats of asphalt paint and then covered with tarred felt. The tarred felt was decided upon after a study of corrosion conditions common to the soil in the country through which the line runs.

Camps for the crews were moved every four or five miles. The entire crews were boarded at these camps. Choosing a high and dry site for the camps was sometimes difficult and bringing supplies to the camp was often a hard task.

The line was tested under an 800-pound cold water test. Only a few leaks were found on the northern end and only one break in that section. That was between Latex and Sarepta and caused by a split joint of pipe. On the southern end very few leaks were found and on the northern end not a single leak has been found since oil was started through the line. It works under 750 pounds pressure.

Capacity of Line

Although oil is being run through the line at the rate of 14,000 bbls. daily all of the pump stations have not been com-

(Continued on Page C-190)

Laying Line Through Swamp Tough Job

Oxen Used to Haul Pipe While Men Worked in Mud and Water Waist Deep Through Heavily Timbered Lowland

By J. L. Dwyer

Though often neglected, it should be recognized that the small pipeline is an essential component of the complete system of petroleum distribution, and it invariably offers chapters filled with romance, and steeped in deeds of valor.

Following unquestionably the path of petroleum, regardless of what obstacles are presented, the pipelines represent the arteries of the oil industry, and its industrial life must depend upon their pulsations. Mountains and rivers must be crossed, swamps and bayous invaded, and these problems and dozens of others are sufficiently vexatious to try the hearts of Vikings. Regardless of the great difficulties, the pipelines must press on and on, in order that the very lifeblood of the business shall not become stagnant.

There was a decided cosmopolitanism in the dismal dampness of the Louisiana swamp as freed from the annoyances of social intricacies, an engineer from Cornell and a station constructor from Pittsburgh joined a contractor from Kansas City to relate to a chronicler from Tulsa, the tribulations of constructing a pipeline through the bayou country. On their tired faces was that enviable look of self-satisfaction, of personal achievement, for they had conquered the treacherous spread of La Fourche swamp, and across its sluggish waters now stretched a part of the Crusader pipeline system.

In Midst of Jungle

As the tale was unfolded, the tall pines nodded their topmost branches, as though in deference to these men who had fought and won another battle in the war of industrial progress. The chilly dampness was relieved by healthy draughts of "Louisiana French drip" coffee, prepared by a cook from New Orleans. The entire scene was one of the jungles. The countless trees, stretched in pensive quietness as far as the eye could see; the swaying pines, the placid waters of the swamp, and the gentle dampness of the southern breeze.

A few yoke of oxen used in placing the line through the swamp, presented a touch of the distant past, and recalled that once more, old agencies had been bent to new purposes, and utilized for modern practices. The braying of Missouri mules alternated with the croaking of the great great grandfather of 15,000 tadpoles, who eyed the group skeptically from his perch on a log. The bull frog was the only living evidence of an indescribable something which one felt was at hand; namely, the protest and objection of the elements in this swamp at the invasion of a land which had been theirs alone for centuries.

Save for the pipeline gangs, the swamps and the bayous were untenanted for miles, and the still waters were undisturbed. A water moccasin swam aimlessly about, as though his home had been wrecked by the joints of pipe. At every turn was quiet, languor, repose, like the great calm after the storm.

Attracted by the possibilities of transporting crude oil from the great Smackover Field, the Crusader Pipe Line Co. of Arkansas, planned and subsequently built a 10-inch line from Norphlet, Ark., a town just below Smackover, to a point 2 miles below Faraday, La., on the banks of the Mississippi River.

Presented Many Obstacles

Although only 140 miles in length, and while there is only a difference of 200 feet in elevation between the highest and lowest points in the line, the Crusader pipeline offered many obstacles which engineering and construction agencies were forced to overcome. The numerous swamps and bayous offered forcible resistance to the entry of the line with its pump stations and attendent evidences of modern progress.

In its length, the line encounters numerous small streams and branches, and it crosses three navigable streams, the Ouachita, Boeuf and the Tensas Rivers. At the point of crossing, the Ouachita River is 800 feet wide, and the Boeuf and Tensas Rivers, 600 feet respectively. The Ouachita is crossed 5 miles north of Monroe, La., the Boeuf, 2 miles south of Alto, La., and the Tensas, at the town of Clayton, La. These crossings and the La Fourche swamp presented the tremendous difficulties of the line.

Two Lines Across Rivers

Two lines of pipe were laid across each river as a safety factor. The ditches down to the river edges were dug, and then the pipe was pulled across the rivers with cables operated upon pipe windlasses. The cables were seven-eighths of an inch thick, and two lines were used in pulling the pipe. One cable was placed in direct line between the ditches upon both river banks, and the other, approximately 500 feet upstream. Before starting the pull, a bull plug was used to stop the outward end of the pipe, and the buoyancy was sufficient to float the pipe. The straight line was used to pull several joints out into the river, and then the diagonal line would be brought into play to haul the line slightly upstream, and pull a small amount of slack into it, to counteract the pressure of the current. In addition to the regular joint between two lengths of pipe, river clamps, of special construction for marine pipeline work were placed in position over the pipe collars. In addition to putting slack into the line, the diagonal pipe cable served to protect the line against damage from the mud which was constantly stirred up from the river bed as a result of the work.

Pipeline right of way cleared through a swamp

Swamp Hardest Problem

The La Fourche swamp, 5 miles east of Monroe, La., was the hardest problem on the line. This swamp is a heavily timbered lowland subject to flood waters backed up by the Boeuf and the Ouachita Rivers. During flood stage, the water is 3 miles wide, and has an average depth of 12 to 15 feet. La Fourche has no definite channels, but has innumerable fingers or currents, which change their positions without warning. The entire swamp is 5 miles wide.

During the construction of the line through this swamp, the pipe was strung through the flooded area by oxen wherever they could go. Portions of the swamp where water was too deep to permit the oxen to work, were crossed by pushing the pipe by hand power off from a specially constructed pipe rack which was built up and floated on the water's edge. The pipe was made up (screwed together) on the rack, and pushed out into the water. The outside end of the line was guided as far as possible by a dozen men holding it in position. In this work the men were compelled to work waist deep in the muddy waters of La Fourche. It was necessary to hold the line in position at all times, as, had it been allowed to settle down into the wrong location, great annoyance would be caused should it settle among stumps in the swamp bottom.

Other swamps, including the Tensas, presented minor problems, involving muddy conditions, but excepting the La Fourche, there were no heavily flooded areas to be crossed. In combating the muddy territory, oxen were used to good advantage, and in work in this territory, trucks were found useless, and bogged down faster than thew could be dug out of the spongy ground. Mud boats were built and skidded along the swampy land by the oxen. These boats were capable of hauling three joints of 10-inch pipe at a time.

Oxen hauling pipe on a mud boat after wagons were found to be impracticable

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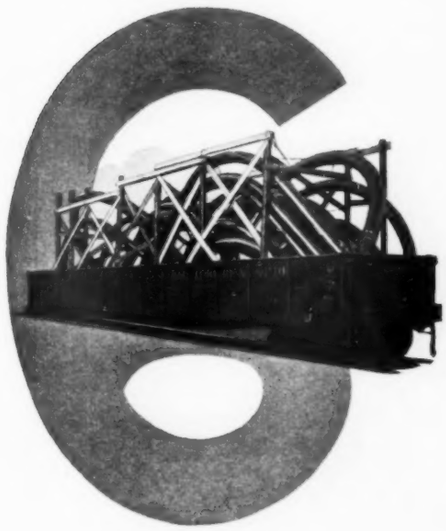

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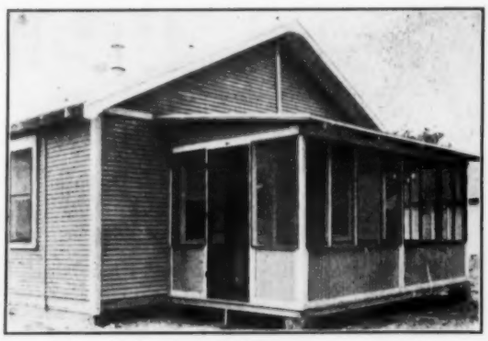
Homes such as these tend to secure more contented and hence more efficient labor. Their first cost is very reasonable and when it is taken into consideration that they can at any time be dismantled and moved the great savings effected can be easily seen.

Model No. 301, illustrated at the right, has a large living room that may also be used as a bedroom. A combination kitchen and dining room and a bedroom. The front porch is built into the house and opens directly into the living room. The back porch is screened and provides a summer dining room or an additional sleeping room during the summer months.

Model 411

Model 411 has proven to be an ideal home for the oil fields. Its room arrangement cannot be improved. This house makes a fine home for superintendents and is widely used as such. The rear porch illustrated is exceptionally large and roomy. It has a panel extending 2′ 5″ above the floor with screen above. This makes a very attractive addition to the house and adds much to its value. Porch comes in sections that fit accurately and are easily erected.



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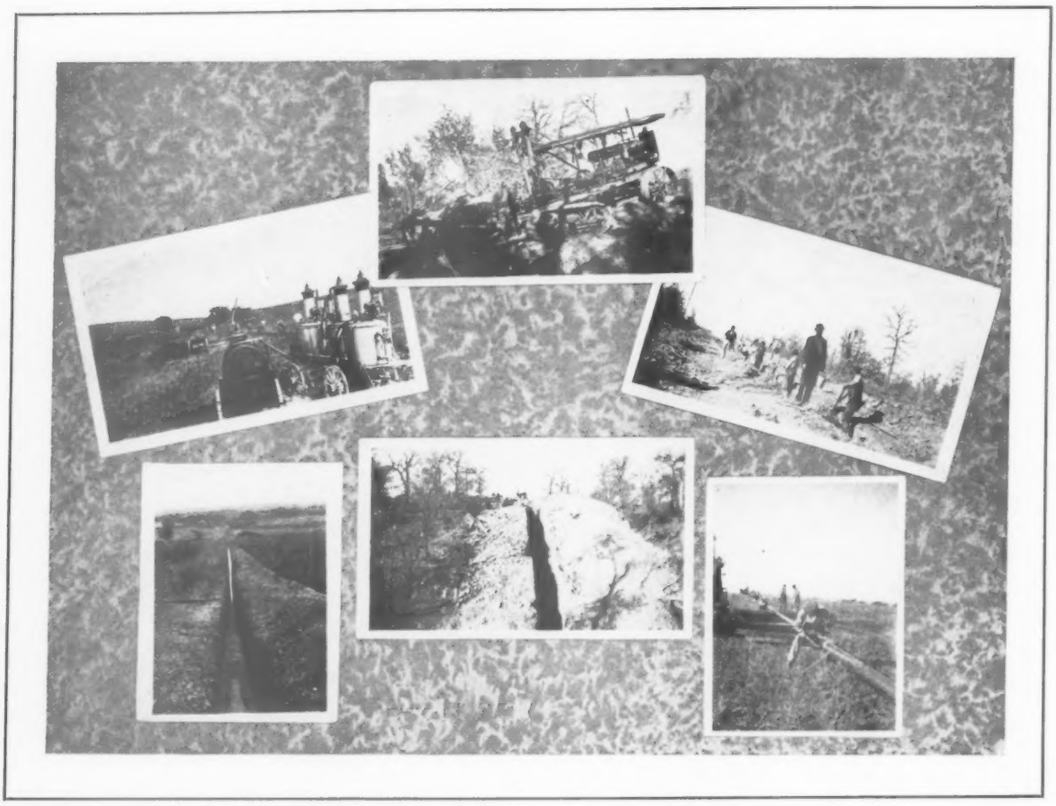

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Development of California Pipelines

Growth of Splendid System Along Pacific Coast Followed Closely Upon the Opening of the Different Oil Fields

By E. P. Bly

(Published through the courtesy of the California Oil Bulletin).

California has approximately 5,000 miles of oil pipelines. The general distribution of these lines is shown on the accompanying maps (Figures 1 and 2). These maps are unique in that they illustrate the contour of the country; that is, they indicate the three dimensions.

The state's petroleum development began over a half century ago, and there has been much action in the picture—tremendously vital action.

Pipeline development runs parallel with the major events in the oil business—such as the opening up of a field, the bringing in of a gusher, or the building of a seaport refinery.

The development of California's first oil field began in 1864. Tunnels were run into the flanks of Sulphur Mountain in Ventura County to make contact with productive oil sands. Considerable oil was obtained in this way and used principally as a lubricant. It was collected in crude wooden tanks by the simple expedient of digging ditches and allowing the oil to ride on the surface of the water that flowed from the tunnels. These ditches formed the first oil transportation systems in the state.

Similar work was done at McKittrick. Some of the old ditches are said to be still in evidence. Most of the production was hauled to the nearest port and shipped to San Francisco.

First Successful Company

In 1875 the first successful oil concern in California, the California Star Oil Co., was launched during this period. It was formed principally through the initiative of D. G. Scofield (later president of Standard Oil Co.), who had recently arrived from Pennsylvania. This company engaged actively in drilling in the Pico Canyon district. Oil was obtained in encouraging quantities and a small refinery was built at Lyon Station, near the present town of Newhall. The oil was hauled to the refinery in barrels.

A new refinery, replacing the one at Lyon Station, was built in 1878 by the California Star Oil Co. at Newhall, which had been made a station on the then recently constructed branch of the Southern Pacific railroad to Los Angeles.

The success of these ventures led to the information in 1879-80 of the Pacific Coast Oil Co. It took over the properties of the California Star Oil Co. and the Santa Clara Oil Co. The Newhall refinery was enlarged and a 2-inch pipeline (the first in California) was laid to it from the wells in Pico Canyon. This pioneer line was soon followed by another one. A short length of 2-inch pipe was laid from the Moody Gulch wells to the railroad station at Alma. A refinery, larger than the one at Newhall, was also built at Alameda on San Francisco Bay. Oil from both districts was transported to this new refinery in tank cars.

At the same time the first well in southern California was being drilled—near Puente, some 25 miles southeast of Los Angeles.

Line to Ventura

In 1884-85, the Mission Transfer Co. built a system comprising 2-inch and 3-inch pipe from Pico Canyon and vicinity to a refinery at Santa Paula; and shortly thereafter laid an extension to tide water at Ventura, 4-inch pipe being used. This line, as in the case of the earlier 2-inch line, had its origin at a point sufficiently high in the mountains so that it could be operated by gravity. The line traversed very rough country. Much of it had to be suspended by cables along the face of cliffs. Some of the original pipe (which, by the way, was shipped around the Horn) is said to be still in operation (in 1926)—presumably at points where corrosive conditions are extremely mild.

The Pacific Coast Oil Co. took advantage of this outlet to the coast. It began the construction of two steamers for transporting oil to the Alameda refinery, and upon their completion abandoned the tank car method of transportation.

The production near Puente in 1886 became sufficiently large to justify a small pipeline to a railroad loading rack nearby. A 2-inch line was accordingly laid to Chino. Another pipeline was built to Angeles basin. It was laid by the Puente Oil Co. (subsequently owned by the Shell Co.). Not long after (about 1890) the Puente Oil Co. constructed a refinery at Chino. Another pipeline was built to serve this refinery.

The first well in the Whittier district in southern California was drilled during 1886-87.

Union Oil Co. Formed

In 1890, the Union Oil Co. was formed. It took over the Pico-Ventura line of the Mission Transfer Co. and the oil production interests that had been established by Lyman Stewart and W. L. Hardison. It also helped to put the small refinery at Santa Paula on its feet.

The Whittier-Fullerton production had by 1896 reached sufficient proportions to justify a pipeline to Los Angeles, and the Union Oil Co. built a small line to its Los Angeles refinery. Previous short lines had been built to tank car loading racks at nearby railroad stations, as has been done in the early stages of practically all oil field development since the pipeline came to be fully recognized as a dependable mode of transportation. (The Union Oil Co.'s Whittier-Fullerton-Los Angeles system has since grown to be an important element in California's network of pipelines. It is said to have transported in one day during 1925 approximately 170,000 bbls.)

A unique pipeline system was built in 1897 by the Alcatraz Refining Co. from its heavy oil seepages in the Santa Maria field to a small refinery near Gaviota—a 3-inch and a 4-inch line in parallel. This system was operated by pumping distillate back from the refinery and mixing it with the thick, viscous oil so as to make pumping possible. Upon the delivery of each batch of this mixture the distillate was refined out and the process repeated. Steam lines have been placed inside larger lines in some instances to facilitate transporting, for short distances, the extremely heavy oil that forms a part of the output of the Santa Maria district.

In 1901 the Standard Oil Co. moved the Pacific Coast Oil Co. refinery from Alameda to Point Richmond and experiments were begun in the Kern River field looking toward the construction of a trunk line outlet to San Francisco Bay.

Figure 1

San Joaquin Outlet

In 1902-03 long cherished hopes for an adequate outlet for San Joaquin Valley oil were now to be fulfilled. The Sunset Railroad, a branch line from Bakersfield into the Midway district, was completed, and the Pacific Coast Oil Co. (Standard Oil Co.) completed a 280-mile 8-inch line from the Kern River field to Point Richmond. A 6-inch branch from this 8-inch trunk line was built into the Coalinga field.

It is interesting to recall that during this period oil from the Kern River field was selling at 10 cents a bbl.!

California's first long trunk line ranks as one of the most important pioneering adventures in pipeline transportation. There are two reasons:

(1) It was the first big job located at a distance from pipeline headquarters in Pennsylvania. Pennsylvania was then considered headquarters because it provided adequate manufacturing facilities and a sufficient supply of experienced labor.

(2) It had to be designed to transport thick, viscous oil—a type that had never been conveyed by pipeline on a big scale before.

Many Were Doubtful

The project was in the beginning the object of a good deal of skepticism. Many people believed that it would result in failure. The farming community in the vicinity of Los Banos made it a point to claim jokingly that if the pipe were actually laid it would ultimately be used for transporting their output of milk rather than for conveying the extremely sticky oil with which they were familiar. When the line was finally completed and the pumps at the Kern River end were set in operation some justification was seen for this pessimistic attitude toward the success of the system. Although the necessity of providing heaters for reducing the viscosity of the oil had been anticipated and temperatures as high as 80 degrees Fahrenheit were obtained, only a small amount of oil (less than 5 per cent of the expected amount) could be delivered. So much heat was dissipated before the oil traveled the distance to the next station that the line became "plugged."

The distance between stations had been purposely reduced from the 40 mile average that prevailed in the east to an average of about 28 to 30 miles, but the spacing was apparently still too great. The pipe had been insulated by encasing it in a specially prepared felt fabric about half an inch thick, but even this precaution, and the fact that the line was buried three feet, failed to keep the oil warm.

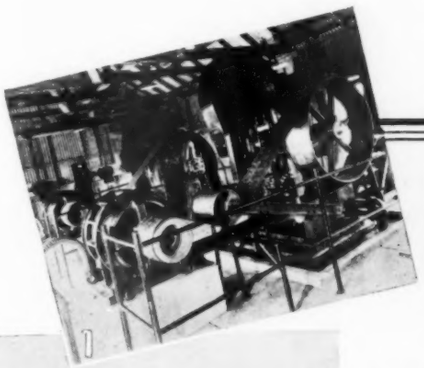
Pumping stations were finally built half-way between the stations already installed, and this solved the problem. As a preliminary step to the construction of the intermediate stations, a tank was built half-way between the first and second stations. It was found that an adequate rate of pumping could be maintained into this tank.

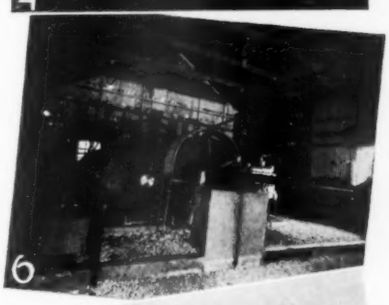
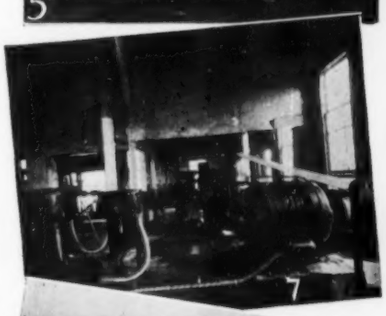
Experiments Tried

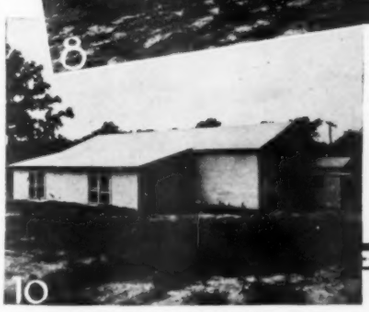
The following methods of avoiding the expense of doubling the number of stations were tried experimentally and rejected:

(1) Water was pumped with the oil to reduce its viscosity. The mixture was found to emulsify so thoroughly that serious doubts were felt

*Mr. Bly is with the pipeline department of the Standard Oil Co. of California.





USING ELECTRIC POWER IN THE OIL FIELDS

ELECTRIFICATION of the oil fields is now a real factor for consideration. Many leading oil companies are using electrical power exclusively and others are fast joining the ranks, after having made extensive investigation of the cost and efficiency of this power medium.

Around the edge of this page are pictures of various electrical installations of a representative group of pipe-line companies that have adopted electricity for power uses.

Further and detailed information on this subject may be secured by communicating with the Commercial Department, Oklahoma Gas & Electric Company, General Office, Oklahoma City.

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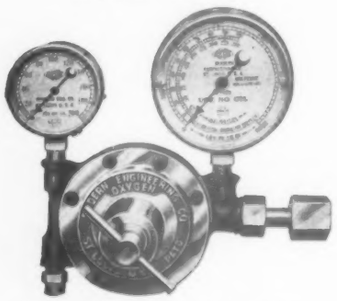

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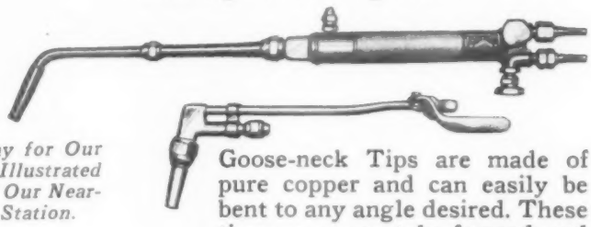

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as to whether a good separation would be obtained at the refinery terminal.

(2) Mixing with light oil or distillate was considered, but the fact was recognized that in large-scale operations this mixing would result in an important increase in refining expense.

(3) Building fires under the pipes at intervals was tried, but observation quickly showed that only a very small increase in capacity could be obtained in this way.

A few of the more intimate details concerning the construction of this pioneer line may be of interest:

The preliminary experimental work, as well as the actual carrying out of the project itself, was entrusted to Forrest M. Towl, who had been chief engineer for certain of the Standard Oil Co.'s holdings in the east.

On April 9, 1902, the first joint of 8-inch pipe was "bucked up"—and then began the arduous 280-mile journey to San Francisco Bay. Considerable ingenuity had to be exercised to keep the work rolling along without interruption. The story is told that a foreman, one scorching day, was given the task of unloading several cars of pipe at an isolated railroad town. The thermometer stood at 110 degrees, and there was a shortage of labor—two very discouraging circumstances. With a resourcefulness, however, that has always been charactristic of "pipeliners," the problem was solved. An arrangement was made with the local justice of the peace. He turned loose almost all the "guests" at his jail, the price of liberty being the speedy unloading of the pipe. Informal justice was not uncommon in those days.

Put Leads in Ice

Later, on one or two occasions, the reverse of the above plan was put into effect. When the work drew near a town, the gang usually began to make plans for a spree. Generally speaking, the adventurous type of laborer then available seemed to have a good deal on his mind beside his prayers. When conditions grew so bad as to interfere with the rapid progress of the work, an arrangement could often be made with the town constable to round up the ringleaders each night, on one pretext or another, and put them "on ice," so to speak. This made them available for the gruelling job of jumping on tongs the next day.

Mr. Towl returned east before the completion of the job, to take over the duties of his chief. He has since become a widely recognized authority on pipeline transportation. The line was completed under the able management of John Page.

Several of the experienced men who came from the eastern fields to assist in the early construction work are still (in 1926) with the Standard Oil Co.—many of them on the line they helped build.

It was several years after the successful completion of the line in 1905 before a smooth running system was achieved. In convenience, slow transportation, and inexperienced station crews, all contributed many handicaps. As an example of inexperience, it is said that the first man who went out to repair a collar leak took a soldering iron and fire pot with him. He had previously been a plumber.

As with all oil trunk lines, the pioneer California line was equipped from the start with a complete telegraph system. No long line could function without rapid communication between the various pumping plants and oil dispatching headquarters.

Later, equipment was installed that permitted the superimposing of telephone communication on the original telegraph circuit. Telegraph operators could then be dispensed with at almost all the pump stations. They were retained only at central points for long distance communication. The telephone and telegraph system of the Standard Oil Co. has since grown into one of the largest systems of its kind in the state.

Activity in 1904

The year 1904 was one of considerable activity. The oil busines was now getting away to a really good start. Oil prices were on the increase and important operations were begun in several quarters:

(1) Another pipeline outlet was provided from the Coalinga field. The Coalinga Oil & Transportation Co. laid 110 miles of 6 inch to Monterey.

(2) The same interests that built the Coalinga-Monterey line took over the Alcatraz Refining Co. lines from Santa Maria to Gaviota and put them into service making oil deliveries to tank steamers. Considerable oil was then being produced in the Santa Maria field and an adequate outlet was very desirable.

(3) The Union Oil Co.'s remarkable Hartnell gusher came in at Santa Maria (at 12,000 bbls. per day), and this company then began the construction of its 33-mile long, 6-inch line to Port San Luis (also known as Port Harford). It is said that three million barrels of oil were recovered from the Hartnell well.

(4) A 2,000-bbl. flowing well came in in the Salt Lake field and started important activities in this district. An outlet for the oil was provided by the Amalgamated Oil Co. It built a line to a newly constructed refinery in Los Angeles.

(5) The Kern River field reached its peak production.

(6) The discovery well in the Murphy Coyote field (later to be a very prolific district) was brought in.

Second Long Line

The Coalinga-Monterey line was the second long oil artery in California. Unlike the pioneer line, it traverses very rough country (see Figure 1). At one point it reaches an elevation of about 2,600 feet.

At the Salinas River crossing a 560-foot cable suspension span was constructure (since eliminated by re-routing the line across the river).

This system operated for about a year with only four pump stations. Intermediate plants then had to be provided to take care of the rapidly increasing Coalinga production. (Subsequently—about 1910—the transportation of heavy oil became necessary, and heaters were installed at each station. Heating facilities were also placed at points about half way between each of the pumping plants.)

The laying of the Coalinga-Monterey line was part of an interesting piece of strategy. Capt. William Matson, who was instrumental in its construction, had sugar interests in Hawaii. Oil was in demand there for fuel purposes. By transporting oil to the islands, and sugar on the return trip, he kept his ships loaded both ways. (At present—1926—fuel oil for operating the large sugar refinery at Salinas is made available by this line).

By 1904 more than a score of oil refineries were operating at widely scattered points in California.

Development in 1905

In 1905 the Pacific Coast Oil Co. (Standard Oil Co.) laid an 8-inch line from Orcutt, in the Santa Maria field, to Port San Luis (Port Harford). This line does not now (1926) appear on the map. It was taken up in 1918 and relaid elsewhere. The shifting character of the oil business results in frequent transfers of this nature.

The Orcutt-Port San Luis line was the scene of an unusual adventure early in 1909. It developed a bad leak at the broad, shallow Santa Maria River crossing just at the time the spring freshets were at their height. The leak was near one of the blanks and the repair crew had to have an upstream dam to facilitate its work. Men, anchored by ropes, drove a line of posts out from the bank, the line being pointed slightly downstream. Near the top of the posts they suspended two lines of cable and then with great difficulty attached large bundles of brush and even small trees to the cables. The plan was to suddenly drop the entire bulwark and divert the flow of water around the leak location. The scheme worked, but in a way quite different from that expected. The worn-out men were dumfounded to observe that instead of only a small portion of the stream being diverted, the entire torrent changed its course and started off across the flat, sandy country. Everybody concerned had visions of free board at government expense until they finally

SOUTHERN CALIFORNIA OIL PIPE LINE SYSTEMS AND REFINERIES
SALT LAKE FIELD
INGLEWOOD FIELD
MONTEBELLO FIELD
SAN PEDRO
HUNTINGTON BEACH FIELD
COYOTE FIELD
LEGEND
PIPE LINE SYSTEMS
REFINERIES
EQUALLY COMPLICATED NETWORKS OF PIPE LINES EXIST ELSEWHERE IN THE STATE. THE SAN JOAQUIN VALLEY FIELDS, FOR EXAMPLE, WOULD PRESENT AN EXTREMELY INTRICATE PATTERN OF GATHERING LINES IF SHOWN ON A LARGE SCALE.

Figure 2

learned that the land that was inundated had no value for farming purposes.

The Associated Oil Co., which since its organization by various producers in 1901 had had only producing interests, in 1906 took over the Coalinga Oil & Transportation Co.'s line to Monterey and also the National Oil Transportation Co.'s 3 inch and 4-inch line running from Santa Maria to Gaviota (both then controlled by the Matson interests). The Associated Oil Co. now began to take its place as an important factor in all branches of the oil business.

At this time the Pacific Coast Oil Co. was consolidated with the Standard Oil Co. of Iowa (both controlled by the Standard Oil Co. of New Jersey). The new concern began to do business under the name Standard Oil Co.

Kern River Line

The Associated Pipe Line Co. owned jointly by the Associated Oil Co. and the Southern Pacific Railroad Co., built an 8-inch line from the Kern River field to Port Costa, on San Francisco Bay in 1907. The pumping stations were located a little under 30 miles apart, just as were the stations on the pioneer 8-inch line previously mentioned. It was expected that by means of a special innovation ("rifled" pipe) the heavy Kern River oil could be handled satisfactorily with this long station interval. The pipe had been constructed with a spiral twist, and arrangements were made for introducing ten per cent of water with the oil. Previous tests had indicated that the mixture would maintain a spiral whirl and the water would be thrown against the wall of the pipe, thus providing a relatively non-viscous lubricant for the inner core of sticky oil. Obstacles to the successful operation of this scheme developed in the course of a few years, and intermediate pumping stations with heating facilities became necessary (1916).

During 1907 the Standard Oil Co. built an 8-inch branch into the Midway field. This provided the first pipeline outlet from the prolific Midway district and was an outstanding factor in opening up the field.

An important auxiliary activity in the development of the Midway area was the laying of a large mileage of water lines. The semidesert nature of San Joaquin Valley oil country makes the construction of extensive water systems a matter of vital importance.

The Standard Oil Co. extended its system into the McKittrick field (8-inch), in 1908. The Santa Maria field, now at its peak production, was given a third large outlet. The Associated Oil Co. laid an 8 inch line to Gaviota. The original 3-inch and 4-inch lines laid by the Alcatraz Refining Co. were removed.

Midway Field Active

The gusher period in the Midway field now opened up in 1909-10, and the "spotlight" of activity was thrown with full intensity on this area. No more spectacular event has ever occurred in the producing end of the oil business than the blowing in of the historical Lakeview (Union Oil Co.) gusher near Maricopa in 1910. During four months of its relatively short life it is said to have produced an average of 50 000 bbls. per day. The total production was not far from 10,000,000 bbls. (about half of which is said to have been recovered).

Further increases in production were taking place in the Coalinga field at the same time, and the first productive well was brought in in the Lost Hills field.

The following big pipeline work was done:

(1) The Producers Transportation Co., assisted by the Union Oil Co., laid an 8 inch line to Port San Luis from a point in the north McKittrick district and feeders were laid from Sunset, McKittrick, Coalinga and Kern River. A refinery was constructed at the pipeline terminal (Avila).

(2) During 1909 the Associated Pipe Line Co. built an 8-inch "rifled" branch north from Coalinga to its Kern River-Port Costa trunk line. From this junction northward to Port Costa an 8 inch line (also "rifled") was laid parallel with the previous 8-inch. A year later the Associated Pipe Line Co. connected the McKittrick and Coalinga districts with an 8-inch line.

(3) The Standard Oil Co.'s trunk from its junction with the Coalinga line system was enlarged northward branch.

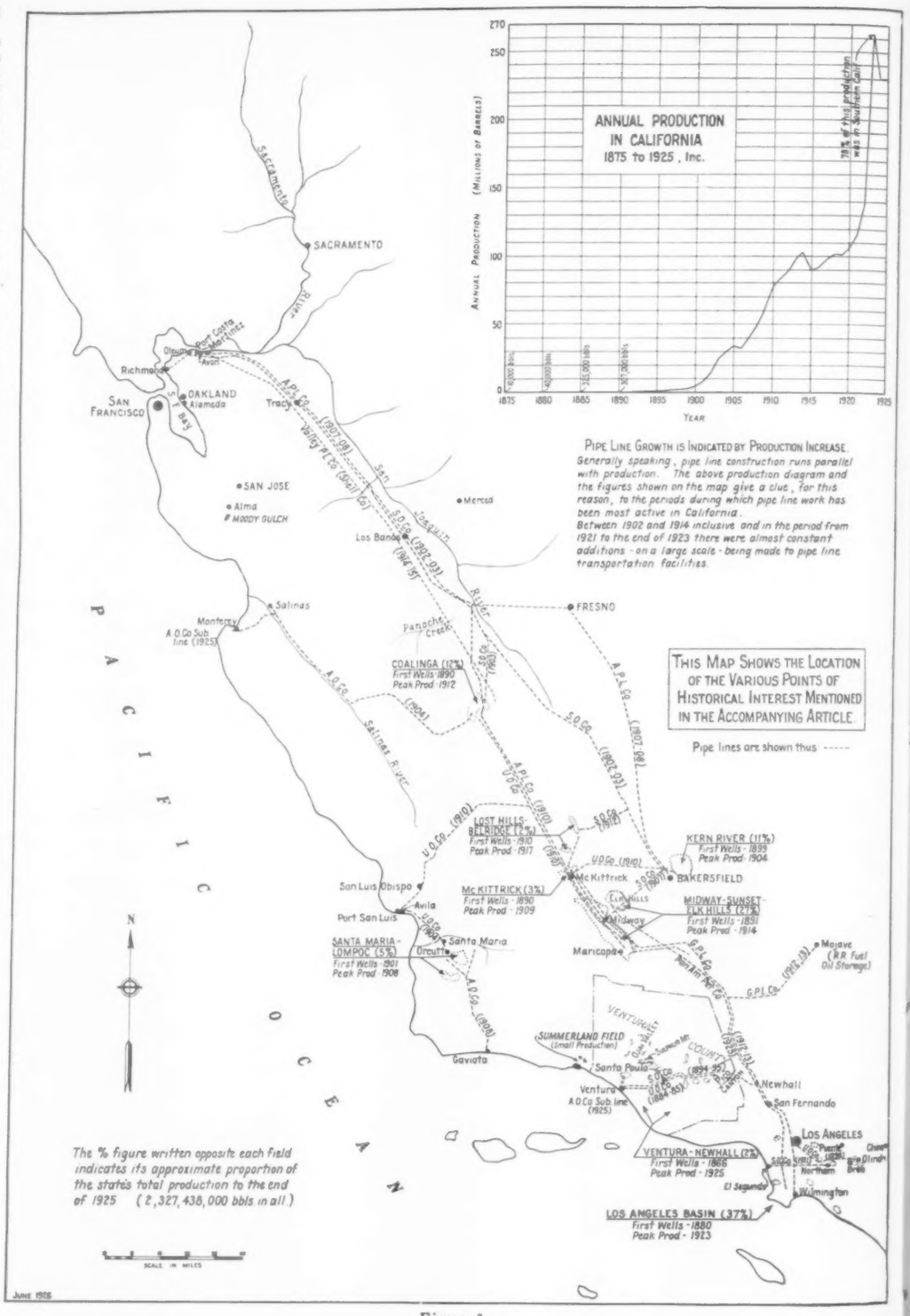
ANNUAL PRODUCTION IN CALIFORNIA 1875 to 1925, Inc.
ANNUAL PRODUCTION (MILLIONS OF BARRELS)
YEAR
79% of this production was in Southern Calif.
PIPE LINE GROWTH IS INDICATED BY PRODUCTION INCREASE.
Generally speaking, pipe line construction runs parallel with production. The above production diagram and the figures shown on the map give a clue, for this reason, to the periods during which pipe line work has been most active in California.
Between 1902 and 1914 inclusive and in the period from 1921 to the end of 1923 there were almost constant additions - on a large scale - being made to pipe line transportation facilities.
THIS MAP SHOWS THE LOCATION OF THE VARIOUS POINTS OF HISTORICAL INTEREST MENTIONED IN THE ACCOMPANYING ARTICLE.
Pipe lines are shown thus
SACRAMENTO
SAN FRANCISCO
OAKLAND
Alameda
Richmond
Port Costa
Martinez
Avon
Tracy
SAN JOSE
Alma
MOODY GULCH
Los Banos
Merced
FRESNO
Salinas
Monterey
A.O.Co Sub line (1925)
COALINGA (12%)
First Wells - 1890
Peak Prod - 1912
LOST HILLS-BELRIDGE (2%)
First Wells - 1910
Peak Prod - 1917
KERN RIVER (11%)
First Wells - 1899
Peak Prod - 1904
BAKERSFIELD
McKittrick
McKITTRICK (3%)
First Wells - 1890
Peak Prod - 1909
MIDWAY-SUNSET-ELK HILLS (27%)
First Wells - 1891
Peak Prod - 1914
San Luis Obispo
Avila
Port San Luis
SANTA MARIA-LOMPOC (5%)
First Wells - 1901
Peak Prod - 1908
Santa Maria
Orcutt
Maricopa
Mojave (R.R. Fuel Oil Storage)
SUMMERLAND FIELD (Small Production)
Gaviota
Santa Paula
Ventura
Newhall
San Fernando
VENTURA-NEWHALL (2%)
First Wells - 1866
Peak Prod - 1925
LOS ANGELES
El Segundo
Wilmington
LOS ANGELES BASIN (37%)
First Wells - 1880
Peak Prod - 1923
PACIFIC OCEAN
The % figure written opposite each field indicates its approximate proportion of the states total production to the end of 1925 (2,327,438,000 bbls in all.)
SCALE IN MILES
JUNE 1926

Figure 3

Producers Transportations

The Producers Transportation line attracted considerable attention because it was the first (and only) line that had been built through the co-operative effort of producers who desired an independent outlet for their oil. The producers (who had organized in 1904 as the Independent Oil Producers Agency) joined with the Union Oil Co. in financing the project. The line was the second in California to cross a mountain range, one point in the line being at an elevation of about 1,300 feet. Notwithstanding the rough character of the country, the system was installed in very rapid time. About 1,000 men laid the line and installed 15 pumping stations, with the necessary heating and other equipment, in five months time—excluding delays caused by bad weather. Four tong gangs and two ditch gangs were used. A tong gang record is said to have been achieved—283 joints of 8-inch in 9 hours (1.1 miles).

The transportation of material for this work was carried out in the face of the most discouraging difficulties. Makeshift roads through rugged country had to be contended with. Seventeen hundred head of horses and mules are said to have been used. Fourteen-up mule teams were a common sight. On some of the curving mountain stretches the skinner had only half his string in full view.

Six caterpillar engines were utilized in addition to the teams. Toward the end of the job, one 3½-ton motor driven truck was tried out. It amazed the old-timers by covering 80 miles in one day. Many present day executives can recall how, at this time, the motor truck and automo-

THOUSANDS of miles of pipe lines are protected with Eclipse "Save-A-Line" because—

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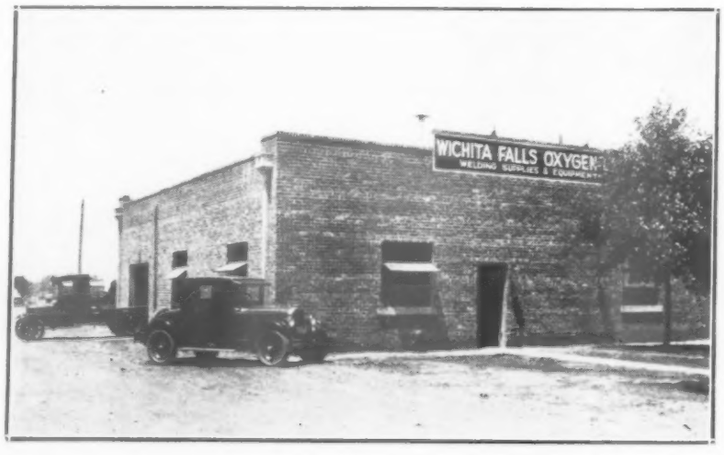

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bile first gave promise of speeding up pipe line work—as well as other phases of industry.

In 1909 the Southern Pacific Co. acquired an extensive interest in the Associated Oil Co.

Increased Capacity

As a result of the activity in the Midway and Coalinga districts, the Standard Oil Co. in 1911 increased the capacity of its trunk line system to San Francisco Bay and substituted, for original duplex pumps, cross compound, non-condensing, triplex oil end, flywheel units (two 50,000 B. P. D. pumps at each of 21 stations.)

The Associated Oil Co. completed an 8-inch line between the Sunset and McKittrick districts. The lien was taken over by the Associated Pipe Line Co., which thus came into possession of a continuous connection between the Sunset field and Port Costa. The water injection system which had been used for the previous two years in the "rifled" section between Coalinga and Port Costa was abandoned and intermediate stations with heaters were installed.

Production in southern California had increased to a point where the Standard Oil Co. felt justified in abandoning its tank car transportation from loading racks located at the end of short pipe lines, and a 6-inch line 23 miles long was laid from Northam to a newly constructed refinery at El Segundo. (As in the case of other main line systems in southern California and elsewhere, this system has since received considerable additions; in 1926 it consists in some places of three 8-inch lines and a 10-inch running parallel with the original 6-inch).

The Associated Oil Co. began the construction of its Avon refinery.

In 1912-13 the Coalinga field reached its peak and production was rapidly increasing in the Midway district. The following important pipeline additions were made:

(1) The General Pipe Line Co. (owned by the General Petroleum Co., which had just been organized on the foundation built by the Esperanza Consolidated Oil Co. during the 12 preceding years) built an 8-inch line from the Midway field to a newly constructed refinery in Los Angeles, and a branch from this line was laid to railroad fuel oil storage at Mojave. A total of 212 miles of 8-inch was involved. (The idea of burning fuel oil in locomotives was introduced many years before by the Union Oil Co. The Santa Fe Railroad Co. lent them a locomotive and experiments were conducted at the Santa Paula Refinery. An extremely important market for residuum was developed in this way).

(2) In making further additions to its trunk line to Point Richmond, the Standard Oil Co. laid the first 12-inch pipe in California.

(3) The Standard Oil Co. built an 8-inch trunk line branch into the Lost Hills field (the discovery well having come in two years before). It also began the construction of a refinery in Bakersfield to relieve pipeline congestion and to supply the local market.

Additions of 12-Inch

Further additions (more 12-inch) were made to the Standard Oil Co.'s trunk line systems to Point Richmond in 1914. This work was done on the division lying south of the junction with the Coalinga branch. The previous 12-inch work had all been done on the north end.

The Valley Pipe Line Co. (Shelly Co.) laid a 170-mile line from the Coalinga field to a newly constructed refinery at Martinez on San Francisco Bay in 1915. (The Shell interests had, in 1913, acquired considerable oil production at Coalinga through their purchase of the "California Oil Fields, Ltd.," which had been organized in 1901.) Eleven stations, with oil heating facilities, were constructed, the average station interval being about 15 miles (five of the stations have since been dismantled.) The first 10 miles of pipe in each station interval was 8-inch, the remainder being 10-inch. In this way the oil was given an opportunity to flow in a larger pipe, where its temperature was relatively low and its viscosity correspondingly high. As the case of all previous trunk lines, noncondensing pumping units were employed, the exhaust steam being used for heating the oil.

This line was the first one in California on which labor-saving machinery was used to any considerable extent. Ditching and pipe-screwing machines were employed and special devices were developed for applying an asphaltic protective coating to the pipe, and for the backfilling work. The screwing machines (California type) are said to have put up as much as 1.65 miles of 8-inch in 9 hours, the 10-inch record being 1.08 miles.

In 1917 the Montebello field in southern California came in. It provided sufficient production to warrant the immediate installation of a 6-inch branch line from the Standard Oil Co.'s Northam-El Segundo system. The Lost Hills field reached its peak this year. The Union Oil Co. acquired full ownership of the Producers Transportation Co.

In 1918 the Valley Pipe Line Co. was dissolved and its properties merged with the Shell Co. of California.

Three Fields in 1919

Three important fields were brought in during 1919. Santa Fe Springs and Richfield in southern California were put on the map by the Union Oil Co.; and the Standard Oil Co. drilled a successful producer in the Elk Hills, in the Midway area. Pipeline facilities for serving these districts were started immediately.

The Huntington Beach field was brought in by the Standard Oil Co. in 1920 and an 8-inch branch was built northward to its main gathering station at Northam.

The Pacific Oil Co. was formed this year. It took over the oil interests of the Southern Pacific Co. and acquired a controlling interest in the Associated Oil Co. Incidentally, a one-third ownership was obtained in the Associated Pipe Line Co. (later acquired by the Standard Oil Co. of California when it consolidated with the Pacific Oil Co. in 1926).

The Long Beach field, California's most prolific single oil field, was discovered by the Shell Company in 1921. It has since produced approximately 200,000,000 bbls.—about twice as much as the entire annual production of the state ten years previous. Land holdings were so widely owned that drilling could not be controlled, and a mighty torrent of oil, such as has seldom been seen, resulted. (Refer to effect on production chart, Figure 3). Extensive pipeline additions were started.

In 1922-23, pipeline activities reached feverish intensity. Signal Hill, Santa Fe Springs, Huntington Beach, Torrance and Dominguez (the latter two just brought in) and all the older southern California districts were providing such quantities of oil that the pipeline companies found it difficult to keep pace with the flood. Entirely new methods of disposing of California oil resulted:

(1) Extremely large quantities were placed in newly constructed storage. Much of the oil was hauled by tanker to San Francisco Bay and pumped south to tank farms in the vicinity of Bakersfield, thus completely reversing the usual direction of flow.

(2) Tremendous quantities of California oil moved eastward through the Panama Canal to Atlantic seaboard refineries.

Tankers Loaded Rapidly

Considerable attention was directed during this period to the rapid loading of tankers. It became evident that centrifugal pumps were well suited to such service because they can economically handle large volumes at low pressure. Several successful installations of this type of equipment were made, the first of them being that of the California Petroleum Corp. at Wilmington. This company is said to have established a ship-loading record of 28,350 bbls. per hour.

During 1922 the Wheeler Ridge field was brought in by the Standard Oil Co.

Two noteworthy events in California pipeline history now took place in 1925:

(1) The first Diesel engine equipped pipeline was installed—the Pan American Co.'s 137-mile 10-inch welded line

(2) The Associated Oil Co. laid two from the Midway field to San Pedro. submarine lines offshore for loading tankers—one from Ventura and the other from Monterey.

The Pan American line is unusual in the following respects:

(a) As mentioned above, it introduced the Diesel engine to California for trunk line pumping purposes.

(b) It is the first long all-welded oil trunk line in California.

(c) It is the only long trunk line in the state that has no facilities for heating the oil pumped (only light oil transportation being anticipated).

(d) It reaches the highest trunk line elevation in the state—4,300 feet, as compared with 4,215 feet in the General Petroleum line, which practically parallels it, about 2,600 feet on the Coalinga-Monterey line, and about 1,300 feet on the Union Oil Co.'s line to Port San Luis.

Pan-American Line

There are five stations on the Pan American line, the oil pumping equipment at each consisting of two 300 h. p. 17x25, vertical, full Diesel engines. Each station complete is said to have cost $275,000. The line is designed for a capacity of 30,000 bbls. per day.

Diesel engines have been used on mid-continent trunk lines for a long time, as these systems do not need to utilize exhaust steam for oil heating purposes (because of the non-viscous character of the oil). The first Diesel type plants were installed on the Gulf Co.'s line in 1907. Since 1913 (principally since 1917) full-Diesel engines have come into common use for oil pumping purposes, a reported total of approximately 200,000 horsepower now being installed.

The submarine lines referred to in item 2 are approximately 3,000 feet long. There is a single 10-inch at Ventura, and an 8-inch and a 12-inch in parallel at Monterey. Each line was made up on land (in two parallel sections) and pulled into the ocean with a tug boat. One section was first towed seaward. It was then joined to the end of the second section—after which the entire 3,000-foot length was snaked into its final resting place. The ends were plugged so the pipe would remain full of air and be as buoyant as possible. Empty 12-inch line pipe will just float. The line was finally weighted down with heavy chains so as to prevent shifting. The successful placing of these most useful terminal facilities is regarded as being a very skillful engineering feat. It is said that no other work of the kind has been done elsewhere in the United States. (Further details are contained in "The Oil and Gas Journal," January 14, 1926, Page 94.) It is interesting to recall that the first submarine loading line on record was laid in 1907 by the Union Oil Co. off the coast of Chile—at the open port of Taltal.

The following summary of more or less special conditions will assist in rounding out this bird's-eye view we are taking of oil transportation facilities. Generally speaking, of course, the detailed business and technical methods employed by California pipeline operators in purchasing oil, gathering it, and handling it through trunk lines, do not differ essentially from those practiced elsewhere in the United States.

The terminal delivery capacity of all trunk lines (principally at seaboard refineries and ship-loading points) amounts to about 1,500,000 bbls. a day. The average daily production now is about 600,000 bbls. One may estimate that every time his heart throbs, approximately 6

SEVERE WEATHER NO DETERRENT TO LAYING OF PIPELINE

—Photo by Underwood & Underwood

bbls. of oil are delivered at California pipeline terminals.

The total pipe mileage, excluding some 250 miles of gasoline lines and the network of miscellaneous oil lines in tank farms and at refineries, is:

Gathering lines	1,500 Miles
Trunk lines	3,500 Miles
(Involving 2,400 miles of right-of-way and 175 pumpingstations).	
Total	5,000 Miles

The State's average daily production of 630,500 bbls. in 1925 amounted to 30 per cent of the country's total. Thus it is seen that California can handle 30 per cent of the production in the United States with only 6 per cent of the total pipeline mileage. This economy results from the proximity of the major fields to seaboard terminals. Southern California, from whence came 78 per cent of the State's production in 1923, is particularly fortunate in this respect.

Gathering lines usually range in size from 2-inch to 8-inch, and trunk lines from about 6-inch to 12-inch (18 per cent of the total main line mileage being 6-inch, 69 per cent 8-inch, 9 per cent 10-inch, and 4 per cent 12-inch). Pumping equipment is usually designed for maximum pressures between 600 pounds per square inch and 800 pounds per square inch (800 pounds in the case of 6-inch pipe and 600 to 700 pounds in the case of 8-inch—the two most common sizes).

The average size of both trunk and gathering lines in California is somewhat larger than in eastern and Mid-Continent fields.

The bulk of the oil handled now ranges in gravity from 15 degrees to 35 degrees A. P. I. The following figures give approximately the present average gravity distribution.

Twenty per cent is under 20 degrees A. P. I. (largely composed of 14 to 15-degree crude and 17 to 18-degree residuum).

Sixty per cent is between 20 degrees and 30 degrees A. P. I. (average 24 to 25 degrees).

Twenty per cent is over 30 degrees A. P. I. (and almost entirely under 40 degrees).

The oil under 20 degrees A. P. I. is usually pumped at temperatures exceeding 100 degrees Fahrenheit (maximum about 160 degrees Fahrenheit).

Although California has two 300-mile long trunk line systems, these arteries are, after all, relatively short. Three hundred miles is only about one-seventh the continuous mileage through which oil could be pumped from Casper, Wyo., to Bayonne, N. J., if existing pipelines were linked together for such a spectacular performance.

Pumping Hot Oil

With one exception, the Pan American line to Wilmington, the trunk lines providing outlets from the San Joaquin Valley fields are equipped with facilities for heating the oil. On the other hand, the quantity of heavy oil produced is southern California is relatively so small that it can economically be mixed with the lighter grade to facilitate pumping.

Heat exchangers, using exhaust steam, and resembling fire-tube boilers in construction, have been generally adopted.

The following special conditions result from the necessity of handling hot oil:

(1) Pumping stations must be close together to conserve the heat put into the oil—about 15 miles as compared with the 40 miles, more or less, that would otherwise be possible. For this reason, among others, trunk lines equipped to handle heavy oil may be expected to cost about twice as much to build as light oil lines. Furthermore, with the heavy oil lines the favorable operating economies offered by condensing steam engines and Diesel engines must be sacrificed to the necessity of having exhaust steam for heating. These conditions tend to offset somewhat the advantageous average location of California fields with reference to seaports.

(2) If the initial desired capacity, or the growth of a pipeline system results in the necessity of "looping" (i.e., departing from the use of a single line of uniform size throughout), it is preferable, especially if hot oil is being handled, that the downstream end of all sections between stations be provided with pipe of larger capacity than the upstream end. A section may, for example, be composed of 8 miles of 8-inch and 7 miles of 10-inch (in the order named), or of 8 miles of 8-inch and 7 miles of double 8-inch.

Reversing this type of arrangement will produce a material increase in pumping pressures. The amount of increase will depend upon the kind of oil being pumped. It is interesting to know that in the case of two lines in parallel on the upstream end, and a single line on the downstream end, the oil will frequently cool in one of the two parallel lines and finally almost cease to flow in this portion of the system.

(3) It is usually true that a rapid flow of hot oil can be maintained with less pressure than if the oil is flowing slowly. A reasonably high speed is required to keep the ground warm.

(4) Computing the capacity of lines conveying viscous oil is not a simple task. Temperature variations throughout the length of the line confuse the situation. Nevertheless, fairly comprehensive methods have been developed. Some discussion of the important theory underlying these methods has been published (by W. F. Durand in the May 1, 1920, issue of "Journal of Electricity," and by Day in his "Handbook of the Petroleum Industry," Vol I).

(5) Operating annoyances of the following kinds result from pumping hot oil:

(a) Varying refinery requirements usually make necessary the alternate pumping of hot heavy oil and cool light oil. The expansion and contraction that takes place may be expected to result in frequent leaks unless proper precautions are taken. In this connection it is especially important that the temperature be altered gradually in changing from one grade of oil to another—say 3 degrees an hour.

(b) The oil must be kept moving or it will cool and plug the line. When a line has become plugged, it must be cleared with light oil or water. Furthermore, this displacing fluid must be heated so as to warm the ground sufficiently to permit the resumption of heavy oil pumping.

(c) Hot lines must, as a rule, be buried at least 2 feet in reasonably dry soil (3 feet or more over mountain passes), or must be otherwise insulated against heat loss, practicaly throughout their length. It is not common practice to apply a special heat insulating material around buried lines. The large expenditure that would be required to install and maintain it would not ordinarily be justified. The soil itself will usually provide reasonable good protection.

Pumping Equipment

Trunk lines: Main line pumping machinery consists for the most part of steam-driven units. Other types comprise only about 10 per cent of the total. The following tabulation gives a general view of the situation:

‡Number of each type in use expressed as a percentage of the total number.

§Combined capacity of all pumps of each type expressed as a percentage of the total combined capacity.

Type—	‡	§
Horizontal duplex *compound steam pumps, * non-condensing	‡59%	§45%
Horizontal *compound crank and flywheed *non-condensing steam pumps	‡29%	§48%
Diesel engine driven power pumps	‡ 2%	§ 3%
†Electrically driven power, and centrifugal pumps	‡10%	§ 4%

*There are several condensing installations, and also some that employ triple expansion, but the percentage of each is small.

†The electrically driven units are, with one or two minor exceptions, or short lines in southern California.

In addition to the centrifugal pump installation included in the above comparison, there is a large centrifugal pump capacity at harbors devoted to loading tankers.

Gathering lines: Because of the highly desirable flexibility of steam units, horizontal duplex steam pumps are generally used on field gathering systems throughout the State.

The much-discussed subject of protection against soil corrosion has been given considerable attention in California. One large company has 500 miles of trunk line pipe in very corrosive soil—so severe in some places as to pit entirely through an 8-inch pipe wall in a year or two unless protective measures are employed.

Difficulties of this kind were encountered as early as 1904 on the Standard Oil Co.'s line from Kern River to Richmond—just two years after the pipe had been laid. One hundred and fifty miles of ditch was opened up and filled with heavy crude oil. The oil was allowed to mix with the backfill. Although this method proved fairly effective, it can no longer be recommended, because of the present high value of oil. More effective methods, which are at the same time reasonably inexpensive, are now employed.

Asphaltic coatings are most commonly used. When properly applied they have given very good results. Eighty per cent of the pipeline reconditioning work done last year involved the use of asphalt.

To prevent earth pressure from squeezing such coatings thin in spots, particularly when hot oil is pumped, the practice has been very generally adopted of applying one, and many times two, spiral wraps of thick felt fabric over the previously applied asphalt. The fabric itself is impregnated and coated on both sides with asphalt in the process of manufacture. This type of protection is said to have been developed to a higher degree of perfection in California than elsewhere in the United States.

Protection with cold paints and with other thinly applied substances has been attempted on a more or less experimental basis.

Electrolysis

The network of pipelines in Southern California is interlaced with electric railway systems. It suffers a slight general depreciation (and somewhat of a fire hazard) because of stray electric current. Some of the larger companies have taken careful steps to minimize this source of trouble. The lines traverse such valuable territory (farming land and even suburban cities in many cases) that reasonably thorough precautions are justified. The methods used in attempting to keep electric current off pipeline systems are as follows:

(1) Insulated flanges are installed in the lines on both sides of all electric railway crossings and at other strategic points.

(2) The rail bonds are well maintained on stretches of electric lines running parallel with pipelines.

(3) Where pipelines cross each other, one of them is encased in asphalt for a suitable length. The various pipeline companies co-operate in observing this relatively cheap and highly desirable precautionary measure.

(4) Thorough electrolysis surveys are made.

To prevent a destructive interchange of current between parallel lines of the same company, they are often bonded together at intervals. In one instance, before doing this, a small electric lamp could be lighted between parallel lines.

When parallel lines are bonded together, any one of them may be cut without arcing taking place. This lessens the possibility of a dangerous fire.

Welding

It is said that pipeline welding was introduced into California in 1915 by the Kern Trading & Oil Co. A 16-mile gas line was laid between the Midway and McKittrick Fields.

The first welded oil line was laid in 1916 by the same company—about 5 miles of 6-inch in the Midway district. Very little progress in welding oil lines was made until 1921, when pipeline construction on a large scale began in southern California. Many welded oil lines have since been constructed.

Fifteen per cent of the trunk line mileage in the State is now welded, and 20 per cent of the gathering line total.

In addition to these oil lines, so many welded gas and gasoline lines have been laid that skilled welders are reasonably plentiful, and large work can now be undertaken with good assurance of dependable results. Practically the only screwed lines being laid are those that have to be construeted in such a hurry that welding crews cannot be organized in time. In many cases, also, screw pipe is on hand as a result of lines having been taken up elsewhere.

In its trunk line reconditioning in the San Joaquin Valley, the Standard Oil Co. of California is cutting up corroded pipe with torches and is making replacements with welded pipe. Many of the corroded joints are repaired with torches, the collars are cut off, and the pipe is welded back into the line. The Associated Oil Co. also employs this method in its reconditioning work.

The General Pipe Line Co. is minimizing the likelihood of collar leaks on old pipelines by electrically welding the pipe to both ends of all couplings throughout their entire circumference. This work is done while oil is flowing through the line.

Welded manifolds and connections are coming to be accepted as good practice. If well made, they eliminate the frequent leaks characteristic of screwed assemblies. This is especially true of lines handling hot and cool oil alternately.

Welding has been somewhat stimulated by the convenient opportunity it offers for utilizing old drill pipe in building pipelines. A considerable mileage of oil and water lines has been construted with drill pipe that producers have set aside, after continued use, as being unreliable for the exacting duty of drilling wells. The threads and couplings, most of which become well worn, are cut off and discarded. The ends of the joints are beveled for welding at the same time.

Line Scrapers

Most southern California oils deposit a wax-like substance on the inside of pipelines. Occasionally line scrapers (sometimes called "go-devils") have to be pumped with the oil just as in the Eastern Fields. In one instance a southern California line suffered a capacity reduction of 25 per cent in two months' time through failure to run scrapers.

San Joaquin Valley oils are for the most part free from wax.

California deals with such a wide variety of oils that the detailed business of dispatching batches through her gathering lines and trunk lines is perhaps more intricate than elsewhere. The modern refinery, constantly on the alert for operating economies, goes into the field to analyze and segregate at its source the oil that it will ultimately work with. One grade will be found best suited to the manufacture of lubricants; another will promise a high gasoline yield; another will have almost no gasoline content and will have to be handled accordingly Separate field systems are sometimes provided for assembling batches of these different kinds of oils.

It is important that large batches be assembled, so that the progressive mixing which inevitably takes place at the junction between them as they flow through the long trunk line arteries may be relatively small. Other possible sources of mixing and contamination can be avoided only by constant co-operation between field and trunk line forces and by alert watchfulness on the part of everyone concerned. All large pipeline systems devote 24 hours a day—every day—to the task of delivering the proper kind and quantity of oil to the intricately adjusted refineries they serve—just as the refineries themselves engage in the task of keeping a never-ending stream of precious fluids flowing into the machinery of modern life.

NEW 16-INCH GAS LINE

The Empire Gas & Fuel Co. will this week begin the construction of a 16-inch natural gas welded pipeline from Drumright to Osage, Okla., a distance of 22½ miles. It will connect with the company's big line from the Davenport Field to Drumright. The Connor & Son Construction Co. will lay the line and the welding will be done by Kelly, Dempsey & Co.

Cedar poles—24-hour service

WHEN you are in a hurry for poles, wire your order to us! We guarantee to start loading within 24 hours from one of our big distribution yards near you. Our system of tracing by wire will hurry the shipment to you in the shortest possible time. Super-service!

Butt-treatment does not appreciably delay shipment. Treating plants are right in the yard from where shipment is made. By the Pentrex method we guarantee one-half inch penetration of the creosote. See below for list of distribution yards and location of butt-treating plants.

NORTHERN and WESTERN CEDAR
Butt-treated or Untreated

NAUGLE POLE & TIE CO., *59 East Madison St., Chicago*

BRANCH OFFICES: New York, San Francisco, Columbus, Kansas City, Minneapolis, Spokane, Vancouver, Boston
MAIN YARDS: *Chicago, *Pinconning, Mich.; Green Bay, Wis.; *Minneapolis, Minn.; *Spokane, Wash.; *Sand Point, Idaho; Vancouver, B. C.
*Butt-treating plants and Pentrex machines at these yards.

NAUGLE POLES

Telegraph System Important Factor

Pipeline Companies Have Millions Invested in Communication Lines to Insure Service and Prevent Waste

By J. L. Dwyer

Aside from those actually engaged in the pipeline branch of the petroleum industry, there are very few individuals who appreciate or even realize the important function of the pipeline telephone and telegraph system; and yet from the time when the oil is turned into the line from the stock tank upon the lease until it reposes in the "fifty-five" on the tank farm, or is delivered to the awaiting stills at the refinery, the thin copper wires are very active in recording the progress of the oil in transit, and its travel is constantly regulated by the dots and dashes of the Morse code.

Perhaps a very forceful manner of calling attention to this indispensable adjunct of petroleum transportation would be to acquaint the reader with the tremendous investment represented in the private circuits constructed and maintained by the transporting companies. In the United States, the pipeline companies have $24,500,000 invested in their telephone and telegraph systems. Out of this, the largest pipeline system in the nation has $1,500,000 invested in its communication equipment.

A striking feature of the all-important wires, is that when a new pipeline is under construction, the erection of telegraph and telephone poles is the very first step taken in building, and the stringing of the wires is the next. Before a foot of ditch is dug, or a joint of pipe laid, the telegraph wires are in operation. The building of the communication system precedes the construction of the pipeline itself, and during the time the gangs or the machines are "bucking" the joints, headquarters is constantly informed of the progress made and difficulties met. Daily reports, requests for additional material, shipping directions for pipe and equipment, and all necessary company communications are dispatched over the lines.

Last to Be Removed

When a line is abandoned, quite the reverse is the custom, and the poles and lines are the very last thing dismantled. The ditch is uncovered, the pipe is unscrewed, the ditch is refilled, and when only a scar remains upon the face of the earth, the wires are removed from the poles, and the circuit is abolished.

The prime purpose of the pipeline telegraph system is to keep an accurate record of the oil in the lines, and for the enlightenment of the reader who is unfamiliar with pipeline methods, a brief explanation of petroleum transportation is not amiss. It must necessarily be very elemental, and while there are thousands of readers who are perfectly familiar with the workings of this system, there are also many thousands who are not, and for their benefit this explanation is written.

When the oil is produced upon a lease, it flows into a tank called a stock tank. There are varying numbers of stock tanks upon leases, according to the daily production of the wells. The oil remains in the tanks until the pipeline gauger appears to turn it into the pipeline. The tanks most commonly used as stock tanks have a capacity of 250 bbls. Immediately after erection, each tank is carefully measured or "strapped" (in the language of the pipeliners) and its capacity carefully determined. Computations are made showing how much fluid the tank will contain at every quarter-inch vertical height. When the gauger appears upon the scene, he first measures the height of the oil in the tank. This measurement is checked by the lease foreman or other representative of the oil producer, and the stops at the bottom of the tank are opened permitting the oil to flow into the pipeline. When the tank is empty, or nearly so, the stops are closed, and the height of the oil in the tank is again measured by the gauger and checked by the foreman. The difference in height is computed and tickets signed by both the gauger and foreman are kept as records.

Gaugers Report by Wire

Then comes the first use of the telegraph line in transportation of oil. Each day every gauger for every pipeline company telegraph to the oil dispatcher at pipeline headquarters, the amount of oil run by him, and gives the detailed information as to what lease it originated upon. This procedure has a twofold purpose; first, it enables the pipeline company to know every morning how much oil was run by it during the preceding day, and where it came from; second, it accelerates the bookkeeping, for the first book entries are made from the gaugers' wires, and credit is given to the producers and royalty owners from the telegraph forms. The original run tickets are mailed to headquarters, and upon their receipt, the book entries are checked for error.

When the oil enters the line from the stock tank, it is pumped to the nearest pipeline station, possibly a main line station, but more likely an auxiliary station. Eventually it finds its way to the main line station; and once more, the telegraph line is brought into action. Perhaps the easiest way of acquainting the reader with the function of the pipeline telegraph is to compare it to a railroad dispatcher's office, for it bears the same relation to the movement of oil that the dispatcher in the railroad office does to the movement of trains.

At every main line station, the contents of each tank are gauged every hour, and the figures wired immediately to the oil dispatcher at headquarters. On a table in front of him, is a long wide pad ruled with spaces for each station, very similar to a train dispatcher's sheet. The contents of the main line station tanks show the receipts, and when they are reported, the pump speed at which the station is working is also wired, as this shows the delivery rate at which oil is being pumped to the station next up the line. On the run sheet in front of the oil dispatcher the tank content of every station, and the pump strokes per minute and pressures are marked every hour. A comparison of the figures with the previous hour will immediately detect any variation, and any variation means trouble.

Detecting Line Leaks

One of the most valuable uses of the telegraph system is in detecting line leaks. When the receipts of a main line station suddenly show a decrease, and the delivery rate at the station immediately below is constant and the same amount of oil has been pumped, the dispatcher galvanizes into action. First the sending station is called and the delivery rate is again checked. If it be unchanged, a shut down signal is flashed and no more oil is pumped through this station, as a heavy line leak is almost a certainty in such a case. At various points along the line, tank farms are located, and some empty oil storage is always available. In emergencies like the one described the empty storage comes into use. Just as soon as the discrepancy is discovered, the station below the break is ordered shut down, and the nearest empty tankage is located. The tank farm is wired, and the engineer is ordered to throw the valves wide open and permit the oil being pumped into his station to flow into the tanks.

Although the line is broken and oil cannot be pumped to the station adjacent to the break, the continuity of service must be maintained, and the oil must be accepted from the leases just as it is produced, as otherwise a hardship would be caused the producer because the majority of leases contain a very limited amount of tankage, and in flush fields usually not over one day's oil may be stored without serious congestion.

To stop accepting the oil on account of broken lines would be to clog the leases and the refiners' supply would also be stopped. The delivery of oil is just as important in an emergency of this kind as the acceptance, and the refineries must be given their amounts of oil every hour of the day. In solving this phase of the trouble, the telegraph system is once more brought into play.

Protects Producer and Refiner

A line from Texas may be supplying a refinery near the Great Lakes, and a break may occur in the line somewhere in Kansas. The oil must be taken from the leases in Texas, and must also be delivered to the refinery on the lakes. In addition to shutting down the stations adjacent to the breaks, and throwing open some storage south of the break to handle the oil from the leases, the telegraph must also be used to make up the deficiency in hourly deliveries to the refinery; and therefore, some tank farm north of the break must be wired and ordered to pump enough oil hourly to offset the temporary loss of the pipeline facilities.

In handling this situation the telegraph is often used to summon trucks, men and equipment to make the necessary repairs to the line. If the break be a large one, and the men required to spend many hours at repair work, the wires may be used to send food to stave off the pangs of hunger, and hot coffee to keep out the chill blast of a winter's night. When the

(Continued on Page C-171)

OFFICIALS AND HEADS OF DEPARTMENTS OF THE PRAIR PIPE

Rocky Mountain Lines of Recent Date

Various Gravities of Crude and Different Viscosities Present Problems to Pipeline Companies in that Area

By Frank B. Taylor

The oil business of the Rocky Mountain region has developed within the past 10 years, although it was known long before that oil existed in certain parts of the region. Oil was hauled by wagons in Wyoming to supply refineries with crude, as late as 1907 and even at present, one field in Wyoming is shipping its production by tank trucks to the railroad for transportation to the refining point.

The laying of pipelines for conveying crude is therefore a recent industry and the existing lines are all practically new. However, some of these lines have already been replaced due to the presence of chemicals in the soil that shorten the life of the pipe and permits its usefulness to extend only over a few years. The alkali, or sodium sulphate in the soils of the west is especially hard on iron and steel pipelines and lines laid across the country where this substance abounds in the soil, require relaying every few years.

Use Large Sized Pipe

The tendency in laying pipelines in the Rocky Mountain region has been towards large sizes in preference to small pipe. The cost is the main deterrent and this factor has kept some of the oil companies from laying the larger size lines. However, almost all lines are six inch or larger, though at Cat Creek, two two-inch lines were laid and later changed to four inch. On the other hand, the Sinclair pipeline from Teapot is a 10-inch line with 12-inch loops.

The grade of crude is also a large factor in the determination of the size of line. Where the crude is a light oil, with a large gasoline content, the small pipe will handle it with ease. Salt Creek crude presents some problems never before found in pipeline work. This crude will solidify when the oil from some of the black oil fields will run, because of the large paraffin content in Salt Creek crude. It has been found that some of the black oils can be sent through the lines in the coldest weather. This feature led the Midwest Refining Co.'s pipe line engineers to experiment with an insulated line from the Notches Field. It was found that by insulating this line to conserve the heat, the heavy, black oil from Notches could be pumped even in midwinter.

The following table shows the different gravities of several fields and the viscosity.

LIST OF PIPELINES IN THE ROCKY MOUNTAIN REGION

Oil Lines

From Field—	To	Length	Size Pipe Inches	Owners
Salt Creek	Casper	39.5	3	Midwest Refining Co.
Salt Creek	Casper	39.5	4	Midwest Refining Co.
Salt Creek	Casper	42.2	6	Midwest Refining Co.
Salt Creek	Casper	42.2	6	Midwest Refining Co.
Salt Creek	Casper	42	8	Midwest Refining Co.
Salt Creek	Casper	42	8	Midwest Refining Co.
Salt Creek	Casper	42	10	Midwest Refining Co.
Teapot	Casper	36.6	6	New York Oil Co.
Salt Creek	Casper	42.5	8	Illinois P. L. Co.
Salt Creek	Parco	138	6–8	Producers & Refiners
Salt Creek	Kansas City	716	8–10–12	Sinclair P. L. Co.
Big Muddy	Casper	21.5	8	Illinois P. L. Co.
Big Muddy	Glenrock	2.5	6	Illinois P. L. Co.
Grass Creek	Greybull	85	6–8	Illinois P. L. Co.
Elk Basin	Greybull	63.5	6	Illinois P. L. Co.
Warm Springs	Thermopolis	18	3	Singer Interests
Pilot Butte	Riverton	29.1	3	Illinois P. L. Co.
Dallas-Derby	Lander	18	4–6	Derby Dome, Wyo.
Notches	Railroad	4	4	Midwest Refining
Osage	Railroad	6.77	3	Illinois P. L. Co.
Mule Creek	Railroad	14	3	Illinois P. L. Co.
Lance Creek	Rusk	25.5	6	Illinois P. L. Co.
Brenning Basin	Fetterman	4	4–6	Burns and others
Bolton Creek	Casper	30	6	Kinney Coastal
Poison Spider	Casper	22	6	Fargo Western
Rock River	Rock River Town	7	6	Illinois P. L. Co.
Rock River	Laramie	38.5	6	Illinois P. L. Co.
Rex Lake	Railroad	1.87	6	Illinois P. L. Co.
Simpson Ridge	Hanna	9	4	Producers & Refiners
Ferris	Parco	20	6	Producers & Refiners
Fort Steele	Parco	6	4	Producers & Refiners
Casper	Refineries	6	6	Producers & Refiners
Notches	Lox	4	4	Midwest Refining Co.
Lake Basin	Railroad	6	2	Midwest Refining Co.
Cat Creek	Winnett	20	2–4	Continental Oil Co.
Cat Creek	Winnett	20	6	Continental Oil Co.
Sunburst Field	Sunburst	11	4	Homestake Oil Co.
Sunburst Field	Shelby	16.5	6	Illinois P. L. Co.
Moffat Field	Craig	16	4	The Texas Company
Artesia Field	Artesia	18	4	Continental Oil Co.
Artesia Field	Dayton	12.5	6	Illinois P. L. Co.
Rattlesnake	Gallup	90	4	Continental Oil Co.
Hogback	Farmington	20	3	Midwest Refining Co.

VISCOSITY

FIELD—	Gravity	20	30	40	50	60	70	80	90	100
Elk Basin	43.9	98	54	46	42	40	37	36	35	34
Grass Creek	44.8	150	69	46	41	38	37	36	35	34
Lance Creek	41.8			300	145	60	48	42	39	36
Ferris	39.6		220	160	115	75	59	51	46	41
Pilot Butte	37.4	450	210	150	70	61	54	50	48	46
Salt Creek	37.1	wax	6040	300	151	125	80	54	52	49
Rock River	37.1			280	85	62	52	48	46	44
Lost Soldier	33.5			1600	170	95	66	55	50	47
Big Muddy	32.8		1350	450	240	145	95	75	65	56
Mule Creek	32.2		1600	540	280	170	120	95	80	70
*Hamilton Dme.	27.1	1500	800	450	325	265	205	165	125	90
*Maverick Spg.	22.5			1400	980	675	510	380	285	210
*Grass Crk, heavy	21.6		2800	2050	1330	950	686	570	410	267

*Hamilton Dome, Maverick Springs and Grass Creek heavy are black oils.

Gravity No Criterion

It is readily seen that the gravity of a crude cannot be relied upon as a criterion to show how it will act in a pipeline Salt Creek and Rock River have the same gravity, yet the Rock River crude can be pumped almost any weather while Salt Creek must be kept warm or the whole line will freeze solid in a cold snap. The recent completion of the Continental Oil Co.'s line from Rattlesnake Field to Gallup, in New Mexico, is shipping the light crude there for nearly 100 miles through a four-inch pipe. This is an exceptionally high grade oil, however.

Elk Basin crude has never given any trouble in shipment through pipelines, but Grass Creek light oil, with a higher gravity, often reports trouble on the line. However, another phase of this may be due to the fact that the Grass Creek crude travels by gravity, only, through a pipe line 85 miles long.

There are 41 pipelines bringing oil or gas from the fields of the Rocky Mountain region to refining points or cities using natural gas. Salt Creek being the largest producing field has the greatest number of lines.

The Midwest Refining Co. has seven lines carrying oil and naphtha as follows:

One 3-inch naphtha line, 39½ miles.
One 4-inch naphtha line, 39½ miles.
Two 6 inch oil lines, 42.2 miles.
Two 8-inch oil lines, 42 miles.
One 10-inch oil line, 42 miles.

Other Main Lines

Besides the Midwest Refining Co's lines at Salt Creek, the New York Oil Co. has the former Central Pipe Line Co.'s line from Salt Creek to Casper, Wyo., and the New York Oil Co. is now bringing gas from Teapot to Casper through this line. The line is 6 inch and 36.6 miles long.

The Producers' & Refiners Corp. has an oil line from the Salt Creek Field, laid with 16.22 miles of 6 inch and 18.2 miles of 8-inch. This line extends from Casper to Mahoney Dome in the Lost Soldier Field and is 89.4 miles long from Casper to Mahoney.

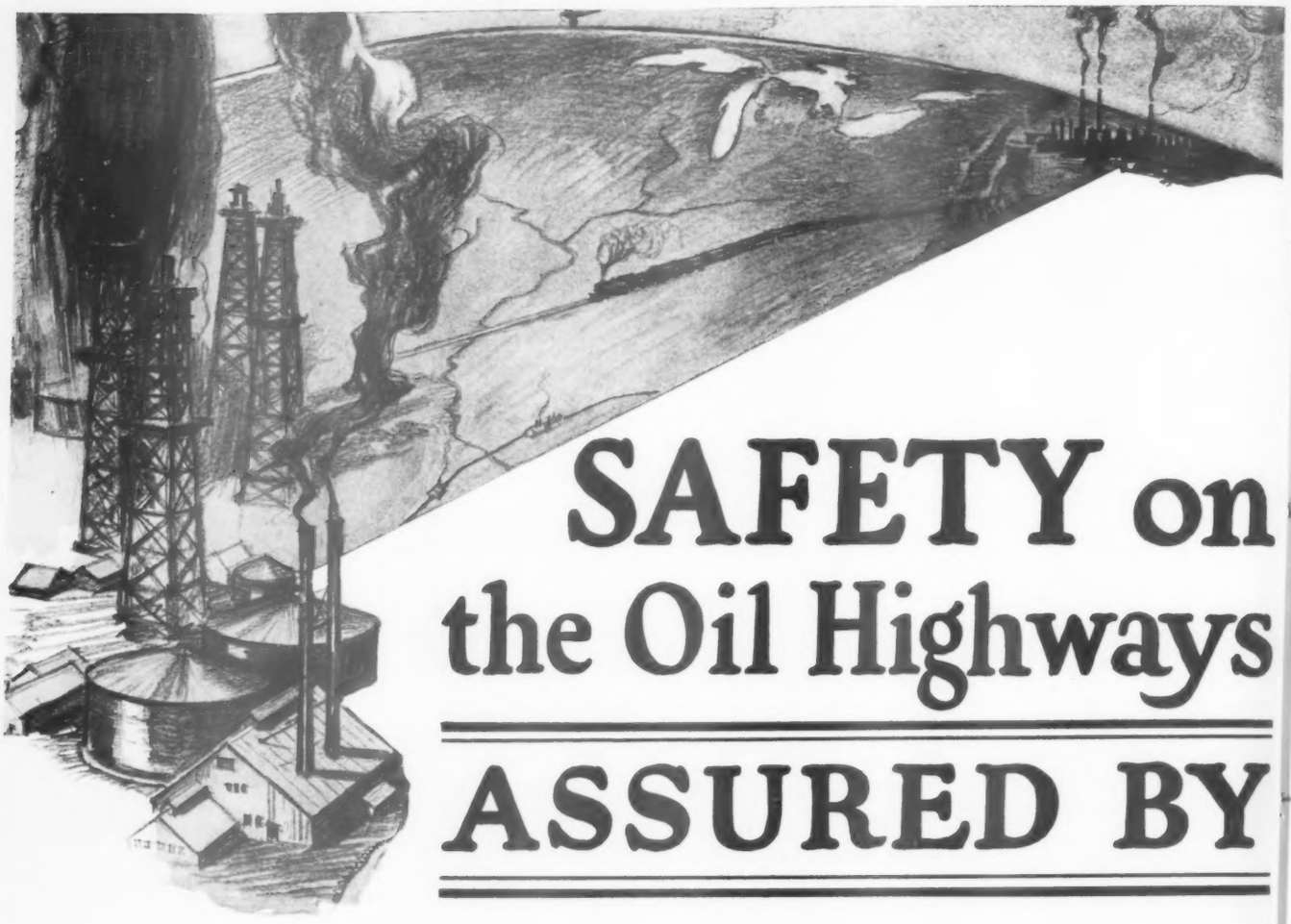
The Illinois Pipe Line Co. has an 8-inch line from Salt Creek to Illco, 30½ miles and then to Casper, 14 miles of the same size.

The Big Muddy Field has one 8-inch line to Casper, 21½ miles long, owned by the Illinois Pipe Line Co. and this line also connects at Casper with the Salt Creek, Illco line, so that Big Muddy oil could be sent to Salt Creek if wanted. The Big Muddy also has a line to the Glenrock refinery of the Continental Oil Co., 2½ miles in length and 6-inch pipe, owned by the Illinois Pipe Line Co.

Teapot Dome is the start of the line of the Sinclair Pipe Line Co. This line runs for 15 miles from Teapot as two 8-inch lines, then changes to a 10-inch line to the Clayton Tank Farm, a distance of 42.9 miles. From Clayton to Glendo it is one line of 12 inch, Glendo to Fort Laramie is 10-inch, and from Fort Laramie to the Wyoming Nebraska

(Continued on Page C-146)

RAIRIE PIPE LINE CO. AT THE ANNUAL GET-TOGETHER MEETING



SAFETY on the Oil Highways ASSURED BY

FOR example, take the Walworth Double Disc iron body gate valve, Here is a valve that does its job like a husky smooth-working cop in a Sunday traffic jam. When it says "Stop" or "Go" that's what happens.

Its action instantly releases the flow of traffic in oil pipe lines. When the jam comes or any emergency arises, the Walworth Double Disc gate valve takes control with the sudden certainty of big Matt McGrath, the Olympic weight tosser, at Times Square and 42nd Street.

Walworth 700-LB. TEST Double Disc Gate Valve

Iron Body, 125 lb., 700 lb., and 1000 lb. Test

These valves work equally well with the pressure on either side of the disc. Whether the valve is horizontal or vertical the discs are always in alignment and there is no possibility of their being canted to either side in closing or opening.

The bonnet gaskets are an exceptionally high-grade asbestos packing suitable for steam, oil, gas or water and the stuffing box can be repacked under pressure when the valve is wide open.

Walworth Double Disc gate valves have removable discs and seat rings and can be reseated and repaired with ordinary machine shop equipment. The 125-lb. 1924 Pattern Double Disc gate valve is the recognized type in many oil fields and refineries. It is suitable for hot oil up to 350 degrees; for cold water, and for oil or gas working pressures up to 175 lbs. per square inch.

# of America —

WALWORTH VALVES

The 700-lb. Test Patterns are made both screwed and flanged with rising and non-rising stems. They are suitable for 400 lbs. working pressure on cold oil, water or gas lines.

The 1000-lb. Test Pattern is built for working pressures up to 500 lbs. per square inch.

Walworth Sigma Steel Valves

The new line of Walworth Sigma Steel valves and fittings is now available for use in oil fields and refineries for 400, 600 and 900 lbs. working steam pressures or 750, 1000 and 1500 lbs. cold oil pressures. Send for Walworth Sigma Steel Bulletins Nos. 3 and 7 and check up on the "30 Points of Merit" represented in the design, materials and workmanship of these much discussed valves.

Walworth Sigma Steel
SERIES 400
O. S. & Y. Wedge
Gate Valve

WALWORTH COMPANY, BOSTON

Distributors in Principal Cities of the World
Plants at Boston, Kewanee, Ill., Greensburg, Pa., Attalla, Ala.
Walworth International Co., N. Y., *Foreign Representative*

WALWORTH

VALVES, FITTINGS AND TOOLS

for STEAM, WATER, GAS, OIL AND AIR

IT'S *ALL* WORTH – IF WALWORTH

NORDBERG DIESEL ENGINES

FOR OIL LINE PUMPING

A View in the Pump Room

Pumping Station at Hominy, Okla.

Above: Two 750 H.P. Nordberg Diesel engines installed in the pumping station of the Sinclair Pipe Line at Hominy, Oklahoma. Below: One of the Sinclair Stations in which two 440 H.P. Nordberg Diesels are in service.

Sinclair Has Sixteen Nordberg Diesels In Pipe Line Service

Hour after hour, day after day, for long periods without shutdown, Diesel engines in pipe line service must render faithful and dependable performance. In the transportation of oil much depends on the power units. They must be built for hard service. Shutdowns are serious and costly.

There are sixteen Nordberg Diesels in operation on the Sinclair lines, six being of the 750 H.P. size, the other ten—440 H. P. From the time they were started they have given faultless service. Glowing reports have been received from the various stations along the line regarding the ease in which they are handled and cared for. Their upkeep expense has been unusually low. For pipe line pumping they have upheld those high performance standards for which Nordberg engines are noted.

Whether Diesel engines are required for pipe lines, or for power generation, Nordberg Diesels will give the kind of service that you expect. This is being proved daily in many industries where economical and dependable power is essential. They comprise the largest stationary units and the largest installations in America. The complete line in sizes and types permits a selection that will best fit in with your requirements.

When in need of Diesel engines, investigate the advantages offered in Nordberg units. Write for bulletin showing their application in a wide variety of industry.

NORDBERG MFG. CO.

MILWAUKEE, WISCONSIN.

Prominent Pipe Line Company Officials

B. G. DAWES
Chairman of Board, Pure Oil Co.

HENRY M. DAWES
President, Pure Oil Co.

R. W. McILVAIN
Vice President, The Pure Oil Co. in charge Transportation

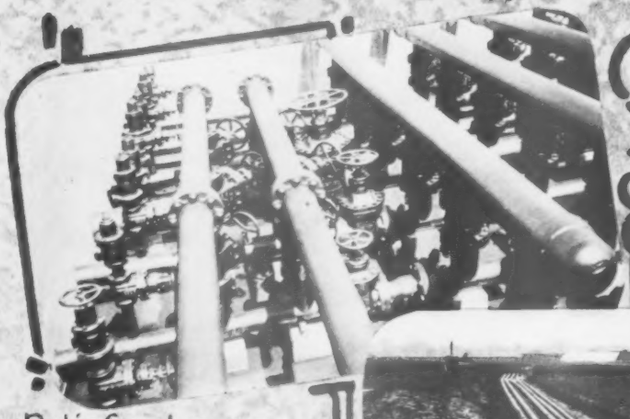
C. B. WATSON
President, Pure Oil Pipe Line Co. (Ohio) and Producers & Refiners Pipe Line Co.

D. C. STEWART
Manager, Magnolia Pipe Line Co.

C. R. STEWART
General Supt., Magnolia Pipe Line Co.

N. H. WEBER
Vice President, The Pure Oil Co., in charge of Distribution

Manifolds at Pump Stations



Relief valves on discharge lines.

Lines being laid to discharge manifold, sheltered by temporary building.

Lines to tank manifold from receiving and discharge manifold.

Covering lines from tank manifold

Tank manifold.

Welded tank manifold.

Lines from discharge manifold to pumps.

Welded and flanged manifold.

NO MORE CORROSION *and* RUST *the* ENEMIES *of* PIPE LINES

JOHNSON GILSONITE PIPE PAINT

which is 99½ per cent pure asphalt is an absolute proof against acid and alkali. Johnson Gilsonite Pipe Paint with asbestos felt paper put on cold, affords a real and lasting protection against corrosion.

JOHNSON GILSONITE PIPE PAINT

is the paint to knead the paper to the pipe. After the paper is once on it is there to stay. Heat up to 450 degrees has absolutely no effect on it.

JOHNSON GILSONITE PIPE PAINT

has been manufactured by us for fourteen years. We believe the best way to overcome corrosion, that worst enemy of pipe lines, is by its use in connection with asbestos felt paper put on the pipe tightly and by the cold method.

JOHNSON GILSONITE PIPE PAINT

is made as a primer, first coater and second coater and although it is the very best paint for pipe, you will find the price per gallon to be on a par with other pipe paints on the market.

For small jobs use Johnson Gilsonite Primer first, and then our Heavy Gilsonite Paint.

We know about pipe lines and the different soils through which they are laid and are prepared to give you expert advice upon when to use paint alone, when Parolite and paint should be used or when to employ asbestos felt paper and paint.

Write and inquire

JOHNSON PAINT COMPANY, INC.

INDEPENDENCE, KANSAS

Henderson Has Furnished Thousands of River Clamps

The W. K. Henderson Iron Works & Supply Company, through the manufacture of River Clamps both in steel and gray iron, has played an important part in pipe line construction in this great Southwestern section. Much of the pipe has been furnished by us. Steel fittings in all types and sizes, both gray iron and steel, we have also furnished for this work.

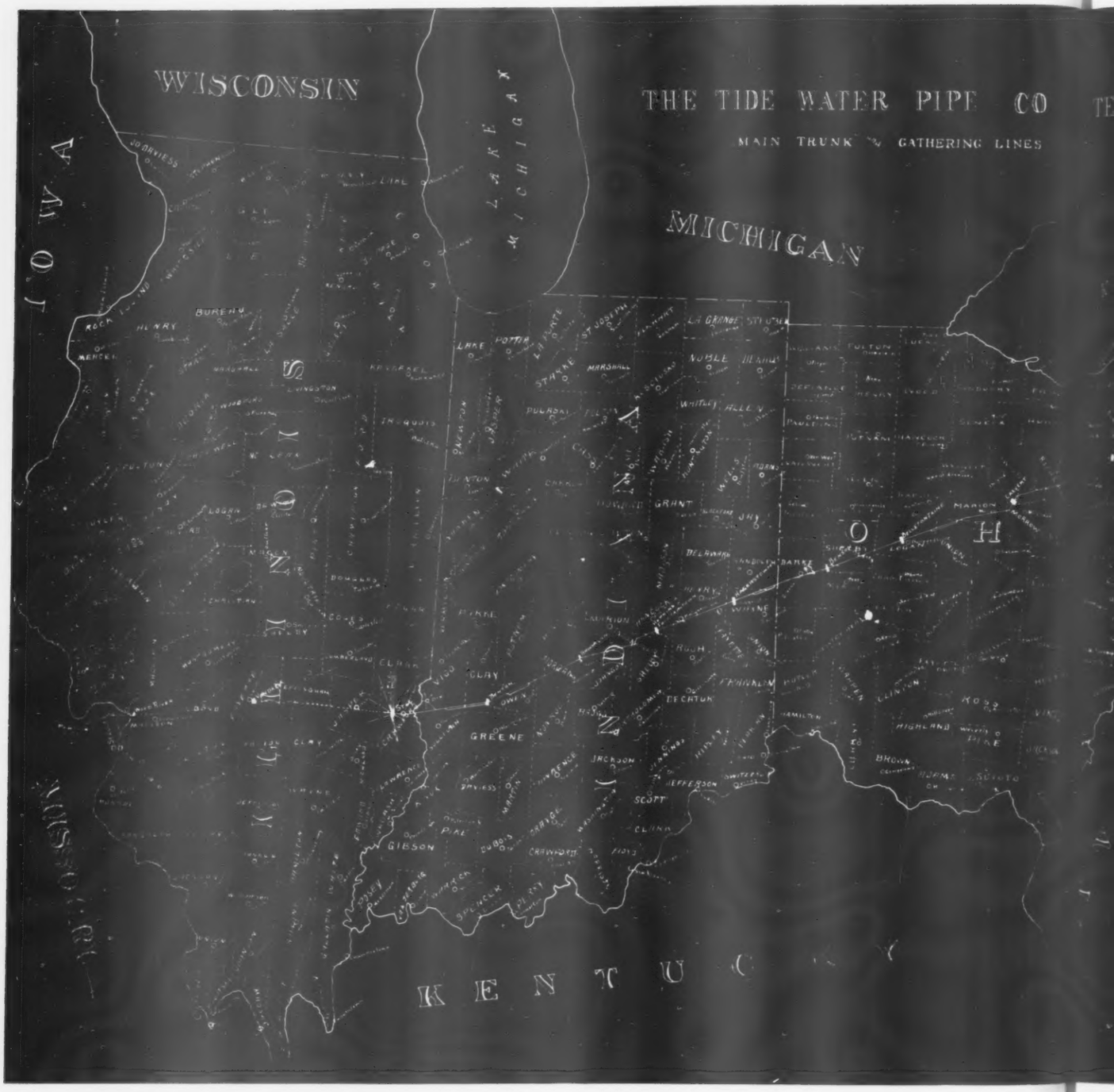
We are prepared and equipped to render to the oil man a splendid complete service in castings of all kinds, pumps, fittings, supplies of all kinds, and in addition to these, we have a "know-how" that comes only with experience.

The W. K. Henderson Iron Works & Supply Co.

Commerce, Spring, Strand and Fannin Sts.

SHREVEPORT, LOUISIANA

"Give your business to the house that has facilities for handling."



ROCKY MOUNTAIN LINES ARE OF RECENT ORIGIN

(Continued from Page C-139)

line is 12-inch. The distance from Glendo to the State line is 106 miles. This line is 716 miles long and has 17 pump stations operated by oil engines, to move the oil through the line.

Other Fields Served

The Grass Creek Field has one line carrying oil to Greybull. This line is 6-inch from the field to Chatam, 29.2 miles and then changes to an 8-inch line from Chatam to Greybull, 49.4. The Hamilton Dome Field line connects with the Grass Creek line about half way between Chatam and Grass Creek and the Hamilton Dome line is 13.9 miles and is 6-inch pipe. The Grass Creek line is all gravity, no pumping stations on the whole line, and is owned by Illinois Pipe Line Co.

The Elk Basin Field, sends its crude through the Illinois Pipe Line Co.'s pipeline to Greybull, a distance of 63½ miles.

The Warm Springs Field in Hot Springs County has an 18 mile line of 3-inch, but this line has not been operating for several years. It is owned by the Singer interests.

The Elk Basin Field also supplies natural gas to Montana towns and cities. This line runs to Billings and is 8-inch for 37.3 miles and then changes to a 10-inch for 29.8 miles. It is owned and operated by the Gallatin Gas Co., a subsidiary of the Ohio Oil Co. The Byron Field also supplies gas to Powell through a line 12.4 miles of 4-inch and 3 miles of 6-inch, owned and operated by the Rocky Mountain Gas Co., a subsidiary of the Ohio Oil Co.

The Pilot Butte Field in Fremont County is served by a 3-inch line from the field to Riverton, 29.1 miles long. The Dallas and Derby Felds in Fremont County are served by a 6-inch line from Wyopo on the railroad to Dallas Dome and the Derby connects with the Dallas line at Dallas. The Dallas Dome is 14 miles long and the 4-inch Derby line is four miles in length. The Pilot Butte line is owned by the Illinois Pipe Line Co. and the Dallas and Derby lines are owned by the company operating the fields, the Derby Dome Wyoming Oil Co.

Illinois Pipelines

The Osage Field in Weston County is served by the Illinois Pipe Line Co. with a short line of 6.77 miles, 3 inch pipe that meets the railroad at Clay Spur.

The Mule Creek Field line is owned by the Illinois Pipe Line Co. and is a 3-inch line 14 miles long from the field to Dakoming on the Burlington Railroad.

The Lance Creek Field is served by the Illinois Pipe Line Co.'s line from the field to Lusk. This is a 6-inch line 25½ miles long.

Brenning Basin in Converse County, has a short line of 4 and 6 inch pipe four miles long, but this line has never been placed in operation.

The Bolton Creek Field in Natrona County has a 6-inch line from the field to Casper, 30 miles long and owned by the Kinney Coastal Oil Co.

The Fargo Western Oil Co. owns the pipeline from Poison Spider to Casper. This line is 22 miles long and is 6-inch.

The Rock River Field in Albany County has two pipelines, both the property of the Illinois Pipe Line Co. One line goes to the railroad at Rock River and is 6-inch pipe, 7 miles long; the second line runs to Laramie and is also 6-inch and 38½ miles long.

The Rex Lake Field, south of the Rock River Field, has a 6-inch pipeline to the railroad, 1.87 miles long, owned by

the Illinois Pipe Line Co.

The Simpson Ridge Field is served by a 4-inch pipeline 9 miles long and owned by the Producers & Refiners Corp. It connects with the Union Pacific Railroad in Carbon County.

The Producers & Refiners Corp. serves the city of Rock Springs with natural gas from the Rock Springs Field. This line is 4-inch, 18 miles long from the field to the city.

It is proposed to lay a line from the LaBarge Field in Lincoln County to Susie on the Union Pacific Railroad. This line will be 40 miles and 6-inch pipe is planned at present. It is to be laid by local companies interested in the La Barge Field.

Lost Soldier Field

Generally speaking, the Lost Soldier Field is considered having two pipelines. However, the Producers & Refiners pipe line extends from Salt Creek Field to Lost Soldier through Casper and then on to Parco, so that while Lost Soldier oil may be shipped either to Casper or Parco, or even to Salt Creek, there is a single trunk line serving the Lost Soldier Field for oil.

The Producers & Refiners Corp. lines in Lost Soldier consists of the main trunk line 138 miles long, from Salt Creek to Parco and of 6-inch pipe. A branch line of 20 miles of 6-inch pipe connects Parco with Fort Steele. This is a 4-inch line and there is another branch line of this main line, at Casper, 6 miles long of 6-inch pipe that serves the White Eagle and The Texas Company's refineries east of Casper.

The Producers & Refiners Corp. also owns a network of gas lines in Wyoming. The big gas line from the Lost Soldier Field to Casper starts as a 10-inch line, then changes to a 12-inch and ends as a 14-inch line at the Casper end. This line is 89.9 miles long without considering the gathering system in the field which would then bring the total mileage over 100 miles and some of the gathering lines are 10-inch also.

The same firm has a 48-mile line of 6-inch pipe from the Sand Draw Field in Fremont County, serving Riverton and Lander with natural gas, one 8-inch line from Eight Mile Lake to Parco, a distance of 15 miles., and a connecting line from the Lost Soldier-Rawlins gas line of the Rocky Mountain Gas Co. to Parco, which is a 12-mile line of 8-inch.

The Rocky Mountain Gas Co.'s line from Lost Soldier to Rawlins is a 4- and 6 inch line; 4 miles of 4-inch and 24.3 miles of 6-inch.

Gas to Refineries

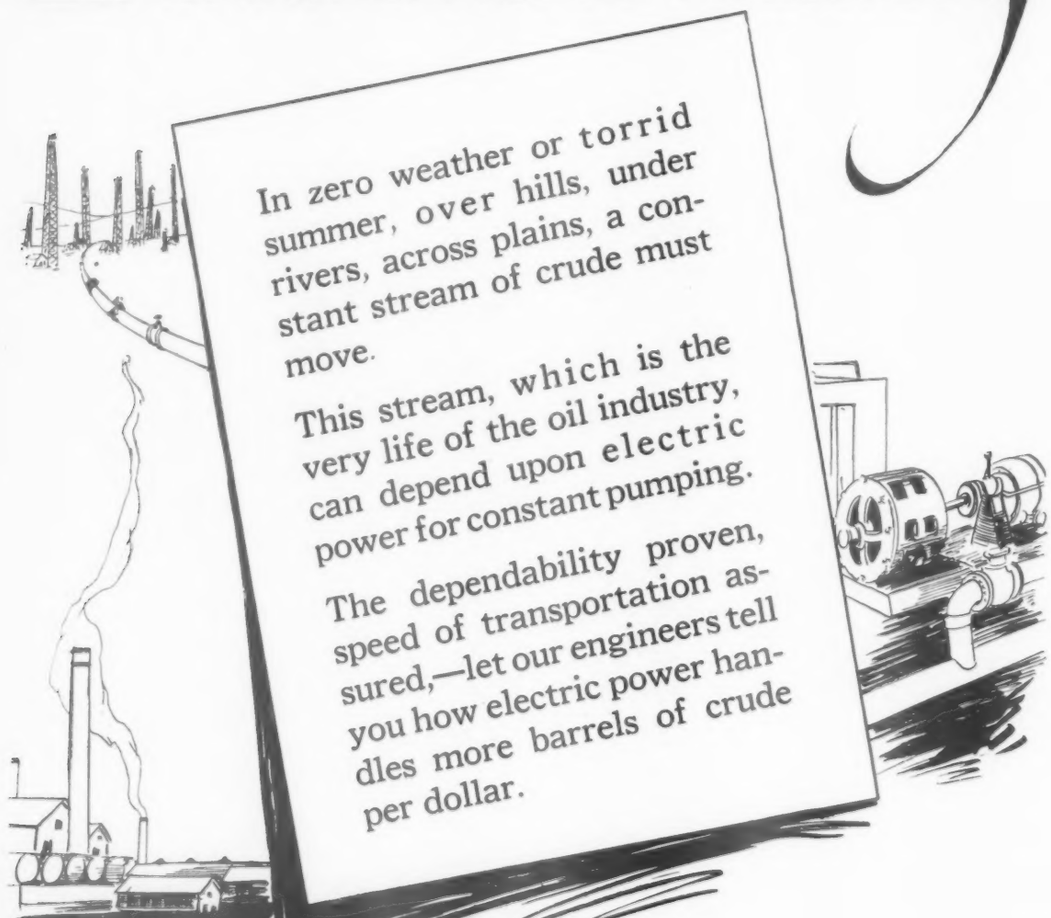
The Wyoming Natural Gas Co.'s line serves the Standard refineries at Greybull with gas from the Hidden Dome Field. The Wyoming Natural Gas Co. is mainly owned by the Durham interests of West Virginia and the towns of Basin and Greybull are also served with gas through this line. This line has 34.7 miles of 8-inch and a loop of 18 miles of 14-inch pipe.

The Midwest Refining Co. made plans to supply gas from the Buffalo Basin gas field in 1922, connecting with the Wyoming Natural Gas Co.'s line. The survey was made and the pipe delivered, but as the Hidden Dome is supplying all the gas wanted, this proposed line has never been laid.

The New York Oil Co. reached an agreement with the Producers & Refiners Corp., on Sand Draw, to take gas from the wells there owned by the Producers & Refiners. The New York Oil Co. laid a line from Sand Draw to connect with the Poison Spider gas line of this company to Casper. The wells at Poison Spider are about done for now, but the Sand Draw is supplying the gas to Casper and Glenrock in conjunction with the Teapot line of the New York Oil Co., that was

(Continued on Page C-153)

POWER
from field to refinery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Government Studying Pipe Corrosion

Samples of Pipe and Protective Coatings Buried in Different Soils in the Various States to Test Resistance

By Charles E. Kern
Washington Bureau, The Oil and Gas Journal

The time has arrived when the entire pipeline industry both for oil and gas will be greatly served by co-operative efforts to assist the United States Bureau of Standards in the great work it has undertaken in respect to determining methods to prevent corrosion of oil and gas pipelines.

Early in 1922, the Bureau of Standards undertook a study of soil corrosion to determine the extent to which this corrosion affects various kinds of metal and to learn the relative resistance power of the different metals used for pipelines.

Later came the equally important feature of this investigation relating to protective methods that might be applied as a coating for the pipelines to avoid corrosion.

The stupendous importance of this inquiry becomes apparent when it is known that in some parts of the State of Louisiana a pipeline running through the swamp land has a life of only about six years. In several sections of the United States the life of a pipeline averages only from six to nine years. This relates to the various classes of steel pipe.

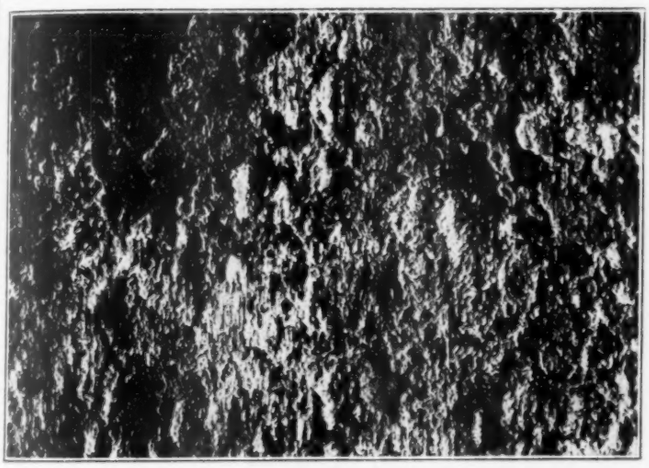
When this work was established early in 1922, other problems were involved in addition to determining the advance of corrosion in its destructive work. It was seen that it would be necessary to devise means to predetermine to what extent soil in different localities throughout the United States is corrosive as a basis for informing the pipeline industry everywhere in respect to the kind of pipe that should be used in a given locality.

Protective Coatings

Wherever corrosion was shown to be excessive, the necessity was shown for a protective coating and that was one feature that has continued to occupy the attention of this investigation. It soon became evident that a protective coating in one soil might not be satisfactory in another soil. In other words, it became necessary to determine the class of protective coating adopted for satisfactory results in the various kinds of soil.

When this investigation was begun along the particular lines that have characterized it since 1922, Kirk H. Logan, electrical engineer, was placed in charge of the work in this activity. The work he then began was the outgrowth of a study which the Bureau of Standards has been conducting during the past 15 years on electrolysis and this study was undertaken to find out whether corrosion was due wholly to electrolysis or in part due to soil conditions.

It has now been demonstrated in certain regions that soil corrosion is a decided factor in the destruction of the pipe. It has been demonstrated that there is such a thing as serious soil corrosion. That is fully recognized by the industry in southern and western states, whereas in the eastern part of the country the stray current from underground electric railways has been held responsible for practically all of the corrosion that occurs, so that it became almost a universal habit of people to refer to all such difficulty as the result of electrolysis.



Wrought iron pipe after being buried 4.06 years in Susquehanna clay at Meridian, Miss. Total loss of weight 60.77 grams; average depth of five deepest pits .045 inch

Material and Corrosion

In the course of time this investigation will discover what distinction there is between the different kinds of pipe material in respect to their resistance to corrosion. Also it will determine what kind of pipe protection ought to be applied under different soil conditions. During the past few years there has been a marked change of opinion in respect to pipe construction. It has been shown that asphaltic coating in one instance after being tested under the ground during a period of two years, softened to the consistency of fresh paint. In another instance, in different soil, this asphaltic coating dried out and hardened with the result it cracked and let the water through to the metal.

There are all sorts of modifications of bituminous coating placed on pipe as a covering. In some instances the pipe is wrapped with cloth and sometimes with asbestos felt and again with paper felt.

In the southern and western states where pipelines are extensive, there is a great need for protective coatings. The acid soils of the south and the alkali soils of the west, especially in Colorado and California, are particularly corrosive. There is a distinctive kind of corrosion in the different types of soil.

It is not possible with present knowledge to determine the life of pipe buried in the soil because there is no method by which the progress of corrosion can be predicted in any particular soil. The rate of corrosion during the first two years has been determined in many soils and the four-year rate will be determined soon, but there is still a great element of uncertainty respecting the progress of corrosion after two or four years. In some cases the rate of corrosion decreases while in others the rate apparently increases with the age of the pipe. The investigation is not far enough along to predict the life of a pipe buried in the soil anywhere with any scientific certainty.

Ultimately it will be possible to plot curves and show the progress of corrosion and whether it increases or decreases by the lapse of years.

When the Bureau of Standards began this investigation pipe was buried in 46 places and there have been two additional installations since that time. This burial of the pipe has been accomplished in about 35 states and it includes many states where there are oil or gas pipelines. The effort of the investigation, however, is not directed toward any geographical distribution of the places for carrying on the tests but rather they have been distributed in a way to place them in representative soils.

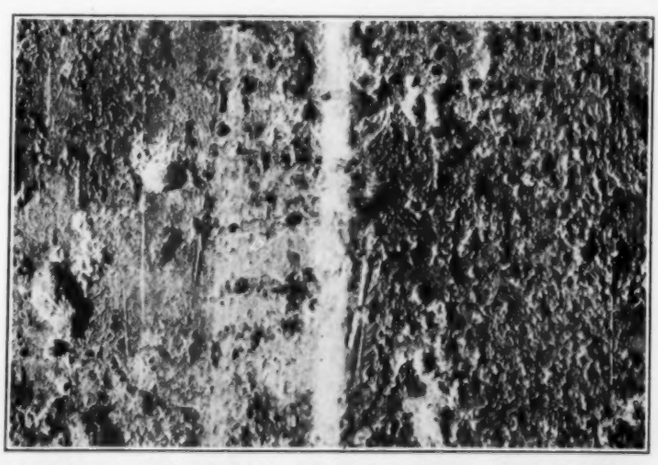
The first step in this investigation was to ask the Bureau of Soils, Department of Agriculture, to furnish a soil survey and the Bureau of Soils was requested to give a list of 50 typical predominant soils. The Bureau of Standards then asked where these 50 typical predominant soils could be found. With that information in hand public utilities were written and asked if they would designate someone to co-operate in this study.

Bessemer steel after being buried 4.06 years in Susquehanna clay at Meridian, Miss. Total loss of weight 61.07 grams; average depth five deepest pits .066 inch

Locations of Tests

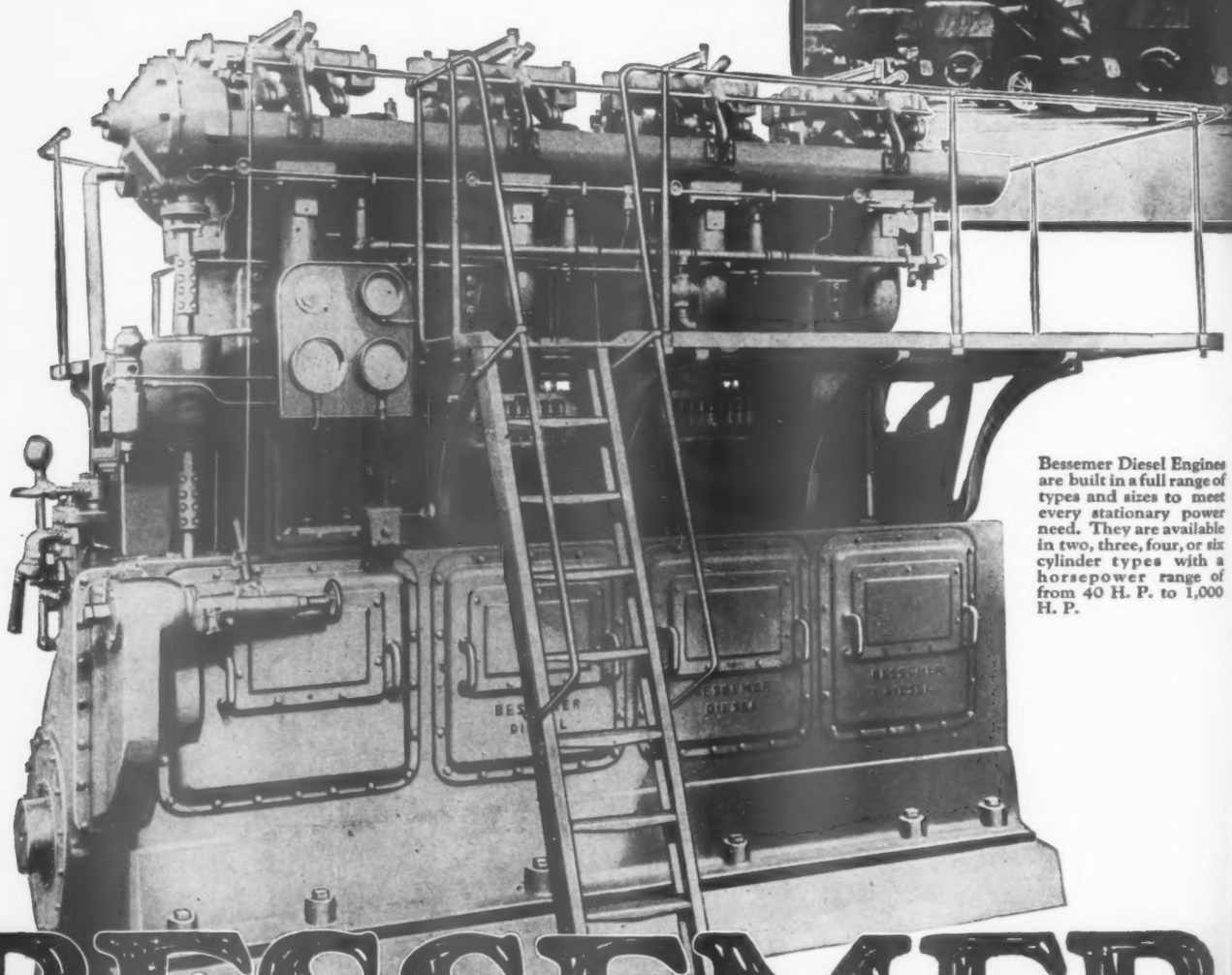
Among the test locations of particular interest to oil men are the tidal marsh near the Bayway Refinery, Elizabeth, N. J.; the swamp land test adjacent to pipelines near Bunkie, La.; the alkali soil tests at Bakersfield, Calif. and Casper, Wyo.; and the test of a soil along the Tidewater pipeline near, Sidney, Ohio.

The extensiveness of this enterprise to fight the destructive elements of corrosion may surprise the oil industry. At this time 15,000 samples of pipe have been obtained and all but 2,000 of these samples have been buried in 35 states. At each place there are buried 140 pipe specimens and from 50 to 100 specimens of pipe coating and other materials. Up to this time, Mr. Logan, in charge



Open hearth steel buried 4.06 years in Susquehanna clay at Meridian, Miss. Total loss of weight 48.37 grams. Average depth five deepest pits .063 inch

POWER *for Pipe Line Pumping*



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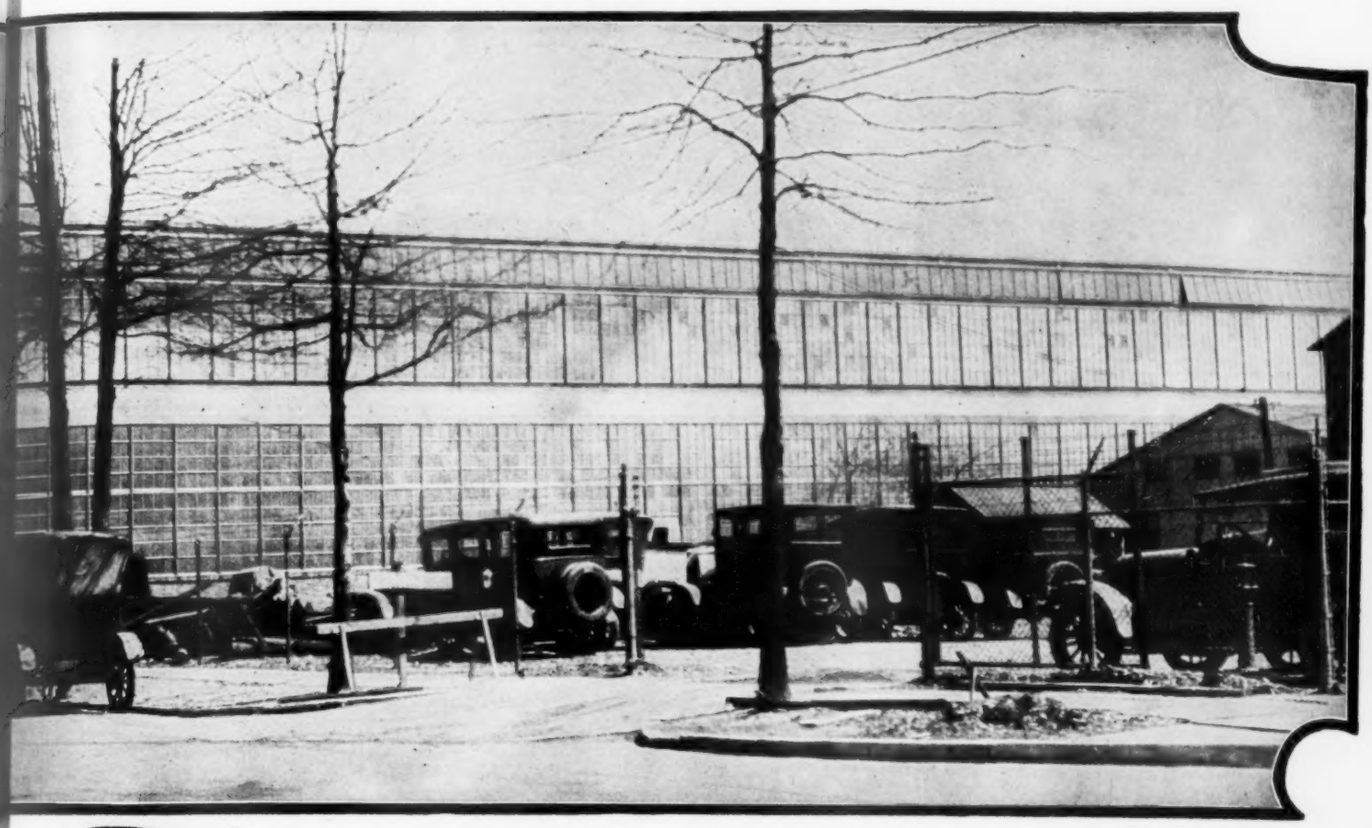

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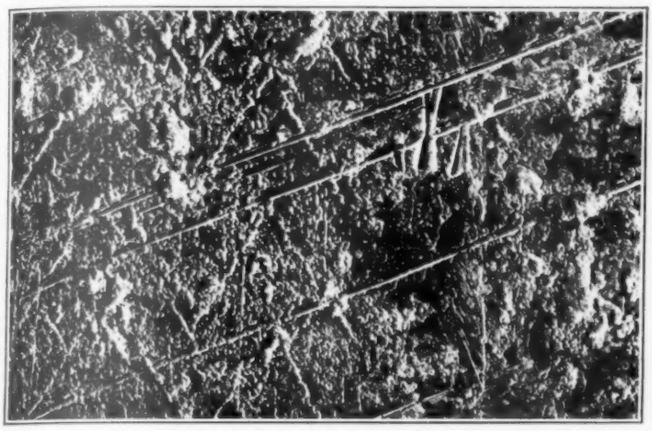
of this work has personally removed nearly all of those samples that have been taken from the trenches for examination.

Some sheet metal has been buried, this material being of the kind used in the construction of underground storage tanks, because such metal is also affected by soil corrosion.

There are literally dozens of protective coatings that have not been sufficiently tried out systematically to determine their relative merits or in fact, according to the view of the Bureau of Standards, to determine whether they have any particular value.

Test to Cover 12 Years

The original plan was to bury six



Copper bearing steel after being buried 4.06 years in Susquehana clay at Meridian, Miss. Total loss of weight 37.12 grams; average depth of five deepest pits .058 inch

identical groups of pipe at each location selected and to take them out at intervals of two years which would extend this investigation over a period of 12 years, four of which years have now elapsed. That plan is being pursued so that the work of taking out the samples

Showing United States Bureau of Standard's samples at Meridian, Miss., some with protective coating and some with alloys of brass and aluminum

to be removed at the end of four years is now in progress.

All of these samples when removed from the experimental trenches are sent to the Bureau of Standards at Washington, D. C. The first thing done with them here is to give them a thorough cleansing. They are run through a bath of ammonium citrate. After that the pits caused by corrosion are dug out a second time and the cleansing is perfected. Then the pipes are weighed by different people, one checking the results obtained by another, and these weights are then available for comparison with the weights of the pipe before it was placed underground and subjected to corrosion. Of course, before they were placed underground each pipe was weighed and thoroughly cleansed.

The Bureau of Standards has devised an instrument for measuring the depth of the pits that result from corrosion and such measurements are checked over by different men engaged in that work. The pipes are then photographed in a way to show by one exposure encircling the entire circumference of the pipe just what has been done by the corrosive elements and that record is preserved. All the specimens are stored for future reference readily accessible as are the photographs by means of a card index.

When this investigation has been completed and the best pipeline coatings determined with respect to the many varieties of soil to be encountered, it will be possible for pipeline companies to add greatly to their economies by a definite knowledge taking the place of the hit or miss methods which of necessity have characterized selections of protective coatings in many instances. Manufacturers of pipeline protective covering will have a wealth of determined facts relating to every soil in which pipe is to be buried and the particular class of covering discovered to be most efficient by actual experiment.

It is quite likely that this work will be extended far beyond the 12 years anticipated when it was initiated because new discoveries and methods of pipe protection will require additional burials over long years to give accurate knowledge of their efficiency.

ROCKY MOUNTAIN LINES ARE OF RECENT ORIGIN

(Continued from Page C-147)

formerly the Central Pipe Line Co.'s oil line. The Sand Draw to Casper line is 74.4 miles long, half being 10-inch and the other half 12-inch, to the poison Spider and then 25 miles of 10 and 12-inch to Casper. A branch line from the Poison Spider to Boone Dome is 15½ miles and 6-inch.

The Notches Field has a 4-inch pipe line from the field to the Burlington Railroad, four miles long, this line is insulated to conserve the heat as the Notches crude is a heavy, asphaltic crude.

Montana

Montana has two fields of importance, Cat Creek and Sunburst. The Lake Basin Field in Stillwater County has a short line to the railroad, 6 miles long, of 2-inch pipe and owned by the Midwest Refining Co. The Cat Creek Field has two lines. One 20 miles long from the field to Winnett, consists of 10 miles of two 2-inch lines and the rest of the line is 4-inch and the other is a 6-inch line the same length. Both lines are owned by the Continental Oil Co.

Sunburst Field lies so close to the rail road that the Illinois Pipe Line Co. there has a gathering system rather than a trunk pipeline. The gathering system delivers the oil to Sunburst town and from there is taken to Coutts, Canada. The distance from Sunburst town to Coutts is 9.96 miles and the oil reaches Sunburst from the field in two 6 inch lines, which is also the size of the Coutts line. The Illinois Pipe Line Co., is now laying a 6-inch line south from the field to Shelby which will be 16.5 miles long.

The Homestake Oil & Refining Co., (Texas Pacific) has a 4-inch line 11 miles long, from the field to Sunburst town and the Montana Giant Oil & Refining Co. has a 2-inch line 7 miles long to Kevin from the field. These are private lines and only laid to serve the leases of the companies owning them.

Colorado

The Florence Field in Colorado is located within such a short distance of the refining plants that the system there does not rank as a trunk pipeline, but rather as a gathering system. The Fort Collins Field also lies along the rail lines and the oil is brought through a gathering system to the loading racks.

The Texas Company bought the Prairie Oil & Gas Co.'s line from Moffat Field to Craig. This line is 16 miles long and 4-inch pipe. A branch line connects Moffat Field with Illes Dome.

A line to carry gas from Fort Collins to Cheyenne, Wyo., has been built by the Cities Service interests and is 6-inch pipe, 28 miles long.

New Mexico

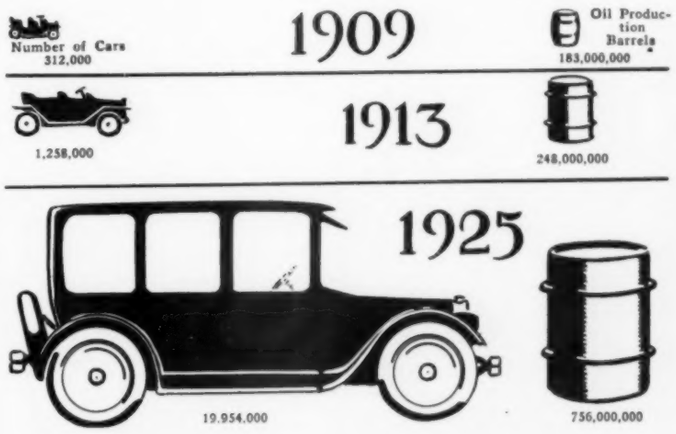
New Mexico has four pipelines in operation, two in the Artesia Field in the south and two in the northern part of the State. The Continental Oil Co. controls or owns the New Mexico Pipe Line Co., which operates a 4-inch line from the Artesia Field to Artesia, a distance of 18 miles. The Illinois Pipe Line Co. owns another line running from the Artesia Field to Dayton on the railroad and this line is 12½ miles long and 6-inch pipe.

In northern New Mexico, the Continental Oil Co. has completed a new pipe line from the Rattlesnake Field to Gallup, on the Santa Fe railroad. Before this line was placed in operation, the production from the Rattlesnake Field went through a branch line to the Midwest Refining Co.'s line to Farmington, but now the production of Rattlesnake and Table Mesa goes south to the Santa Fe, thus reaching a transcontinental railroad so that all refining points can be reached without too intricate freight shipments. This line is 90 miles long and of 4-inch pipe. The very light grade of oil in Rattlesnake, Table Mesa and Hogback, permits the use of the small pipe for these fields.

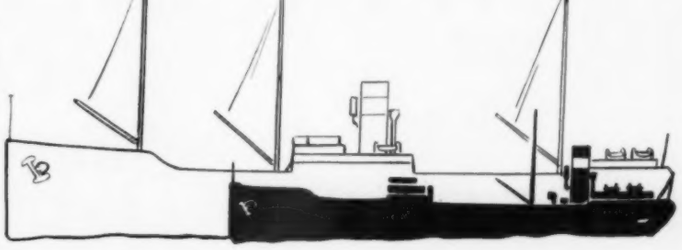
The Midwest Refining Co. has a 3-inch line, 20 miles long from the Hogback Field to Farmington, that carries the oil from that field to the railroad and the Continental Oil Co. has a 2-inch line of 12 miles, from the end of the Midwest line to the Rattlesnake Field that was formerly used to carry the Rattlesnake crude.

Except in the Grass Creek Field, of Wyoming, the crude is all either light or heavy, when sent through the lines. The general practice in the Rocky Mountain region where a difference is made in prices for different grades of oil is for the shipper or pipeline company to deliver so much of that light grade at the terminal when asked for, but as the oil is generally taken by a refining firm affiliated with the pipeline, the practice is simply to pay the producer according to the gauges and gravity tests and run all the crude together to the refining company, charging for the crude as received.

GROWTH OF AUTOMOBILE AND GASOLINE



OIL INDUSTRY AND U. S. MERCHANT MARINE



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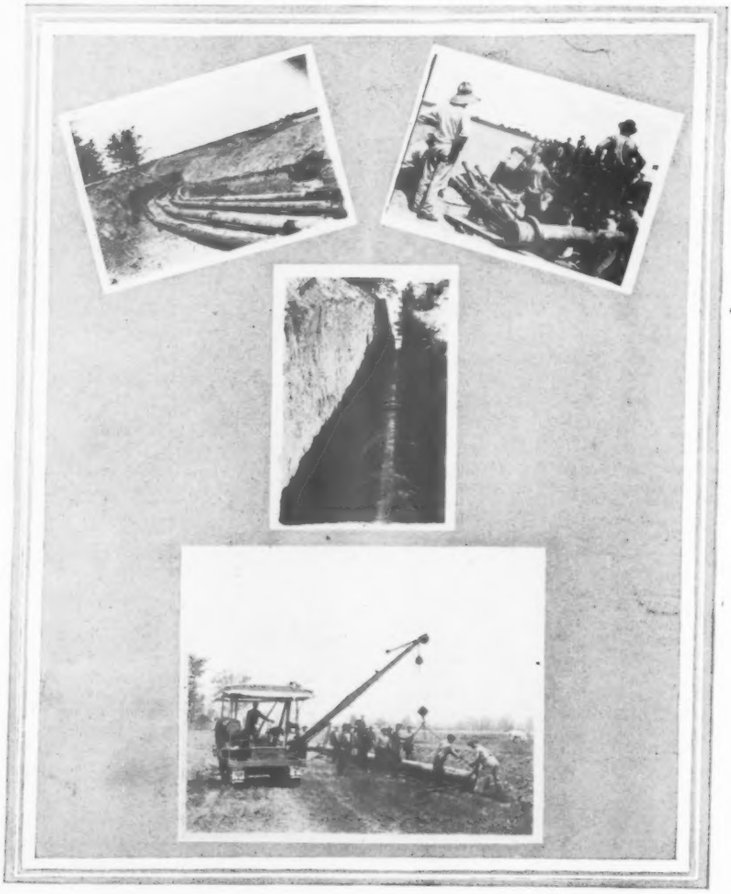

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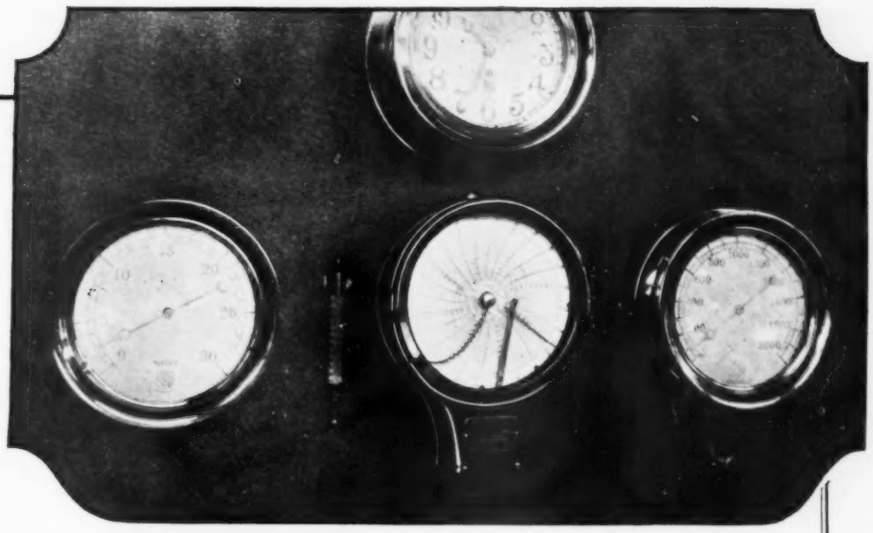

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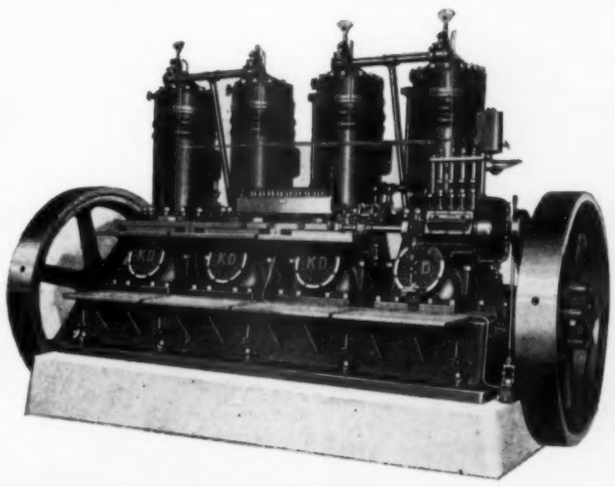

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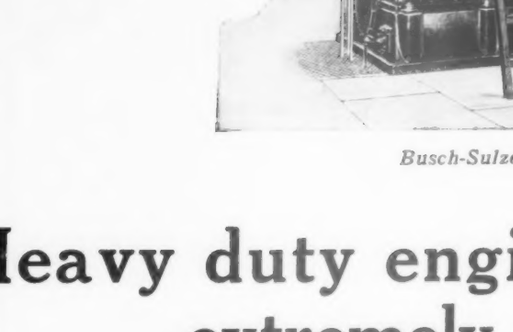

Bowser eight-feed Model "M" double-lever-drive lubricator. The shaft is divided in the middle so that four feeds on each end can be timed to deliver oil at any period desired.

which is why so many of the big power plants on crude transportation lines, are Bowser lubricated.

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OIL STORAGE AND DISTRIBUTION SYSTEMS

THE TEXAS COMPANY'S FIRST LINE EXTENDED FROM SPINDLETOP POOL

The Texas Pipe Line Co. and the Texas Pipe Line Co. of Oklahoma were organized in 1917 as common carriers for the interstate and intrastate transportation of petroleum. Prior to 1917 this pipeline system was owned and operated by The Texas Company as its pipeline department.

The Texas Company's original 6-inch pipeline, constructed in 1902, was from Spindletop to Port Arthur. In 1903, this was extended to Sour Lake and in 1904, extended to Humble. The major extension came in 1907 when an 8-inch trunk line was constructed from Tulsa, Okla., to Humble, Tex., a distance of 470 miles. This was followed by the construction of branch lines from Beaumont to Evangeline, La., and a few years later by main trunk lines from Shreveport, La., to Beaumont, Tex., and from Electra, Tex., to West Dallas, Tex.

With subsequent extensions and branches, the entire system of the Texas Pipe Line Co. and the Texas Pipe Line Co. of Oklahoma now serves all of the principal producing areas in the Gulf Coast, central, north central and north Texas, Louisiana, Arkansas and Oklahoma, comprising a total of 4,802.65 miles of pipeline, of which 2,957.41 miles represents trunk, branch and loop lines and 1,845.24 miles represents gathering lines. In addition, the two pipeline companies operate 9,967 miles of private telegraph and telephone wire, the majority of which is strung on its own poles.

Tidewater Terminals

The Texas Pipe Line Co. maintains headquarters at Houston, Tex., and the Texas Pipe Line Co. of Oklahoma at Tulsa, Okla.

The tidewater terminal of the system is at Port Arthur, Tex. Main pump stations are at Louann, Ark.; Haynesville and Shreveport, La.; Tonkawa, Davenport, Drumright, Tulsa, Henryetta, Stuart, Healdton and Armstrong, Okla.; Electra, Henrietta, Ranger, Fort Worth, Sherman, West Dallas, Corsicana, Concord, Dobbin, Humble, West Columbia, Sour Lake, Logansport, San Augustine, Jasper and Bunker Hill, Tex.

In addition to the facilities at Port Arthur for loading customer's tank steamers, the Texas Pipe Line Co. maintains facilities for loading crude oil on shallow draft vessels at Port Houston, on the Houston Ship channel, and at Big Eddy, on the Sabine River near Orange, Tex. Facilities for delivering crude oil direct into customer's tanks are maintained at Sand Springs and Tulsa, Okla.; Electra, Burkburnett, Wichita Falls, Iowa Park, West Dallas, Ranger, West Columbia, Port Houston and Port Arthur, Tex.

Loading racks for loading crude oil in customer's tankcars are at West Tulsa, Okla.; Louann, Ark.; Shreveport and Oil City, La.; Electra, West Dallas, Corsicana, Ranger, Moran, Bay City, Humble, Port Houston, Sour Lake and Port Arthur, Tex.

Officers and officials of the Texas Pipe Line Co. are: B. E. Hull, president; A. M. Donoghue, vice president; R. B. McLaughlin, secretary; R. J. Daniel, treasurer, and T. J. McMahon, superintendent of oil movement, telegraph and telephone, all of Houston, Tex.

Division superintendents of the Texas Pipe Line Co. are: J. B. Alleman, Beaumont, Tex.; O. E. Stimson, Shreveport, La.; Charles O. Crouch, Houston, Tex.; J. C. Colligan, Dallas, Tex.; J. B. Haden, Fort Worth, Tex., and O. R. Burden, Wichita Falls, Tex.

Officers and officials of the Texas Pipe Line Co. of Oklahoma are: M. Moran, president, Tulsa; B. E. Hull, vice president, Houston, Tex.; H. L. Stewart, treasurer, Tulsa; C. D. Ruff, secretary, Tulsa; J. K. McGoldrick, general superintendent, Tulsa, and T. J. McMahon, superintendent of oil movement, telegraph and telephone, Houston, Tex.

Division superintendents of the Texas Pipe Line Co. of Oklahoma are: W. H. Moran, Tonkawa; T. F. Reagan, Tulsa; William Rinkard, Kiefer; W. A. Shields, Drumright; J. J. Hanrahan, Okmulgee, and J. H. Cain, Healdton.

Pipeline Operations

	1925	1924
Runs (Bbls.):		
Texas	22,575,227	22,927,487
Louisiana	2,579,817	2,863,684
Arkansas	4,550,439	4,277,276
Oklahoma	5,988,948	5,119,975
Total	35,694,431	35,188,422
Delivered to refineries (bbls.):		
Texas	23,792,752	24,245,383
Louisiana	2,246,720	1,154,534
Oklahoma	3,207,324	4,205,313
Total	29,246,796	30,605,230
Transported for others (bbls.)	8,353,320	9,587,753
Trunk line mileage at end of year:		
Texas	1,626.74	1,598.10
Louisiana	161.33	159.30
Arkansas	33.75	33.75
Oklahoma	389.62	388.28
Total	2,211.44	2,179.43
Loop and branch lines:		
Texas	441.42	477.02
Louisiana	18.61	19.22
Oklahoma	258.67	253.05
Total	718.70	749.29
Gathering lines:		
Texas	996.61	837.99
Louisiana	136.13	139.02
Arkansas	73.14	67.28
Oklahoma	608.31	651.33
Total	1,816.19	1,695.62
All lines:		
Texas	3,064.77	2,913.11
Louisiana	318.07	317.54
Arkansas	106.89	101.03
Oklahoma	1,256.60	1,292.66
Total	4,746.33	4,624.34
Telegraph and telephone lines:		
Miles of wire operated	9,841.50	9,967.50
Miles of pole lines	1,229.50	1,279.25

Ships and Shipping

Cargo carried (tons of 2,240 lbs.):	1925	1924
In ocean vessels owned	2,516,495	2,748,713
In ocean vessels operated under charter	10,572	555
	2,527,067	2,749,268
In harbor light's owned	715,507	606,155
In harbor lighters optd. under charter	13,130	23,875
	728,637	630,030
Total	3,255,704	3,379,298
Fuel consumed:		
Fuel oil (bbls.)	1,013,622	1,078,769
Gasoline (bbls.)	406	434
Coal (tons of 2,240 lbs.)	1,304	1,612
Nautical miles run by ocean vessels:		
Loaded	611,354	670,276
In ballast	601,822	623,858
	1,213,176	1,294,134

Railway Traffic

	Dec. 31, 1925	Dec. 31, 1924
Tankcars in service:		
Owned cars	1,871	1,922
Leased cars	3,519	3,341
Total	5,390	5,263
Tankcars loaded during year ended:		
Co. cars owned or lea'd	100,469	104,228
Other cars	9,806	9,412
Total	110,275	113,637
Total mileage Co. cars	61,631,268	70,024,155
Average mileage per car	11,434	13,310

TEXAS FIELDS REQUIRED BIG PIPELINES

(Continued from Page C-112)

pany extended its system from the north into Mexia and Powell during the booms there and later laid an 8-inch line to the refinery here. It handles an average of 25,000 bbls. per day.

The Pure Oil Pipe Line Co., extending from Mexia and Powell to Smith's Bluff on the Neches River, between Beaumont and Port Arthur, grew out of the Mexia boom. It was financed by the Pure Oil Co. and Colonel Humphrey, who opened the Mexia Field. It is an 8-inch line, 180 miles long. W. P. Gage was the president and general manager. Last year the line was acquired by the Prairie Pipe Line Co. and is now operated by that corporation.

The Sun Pipe Line Co., one of the first lines to be laid in the state, has never expanded beyond the coastal region. It has connections with every pool east of Houston.

The vastness of the pipeline mileage is almost beyond the comprehension of those not in close touch with the rapid development of the petroleum industry. The Sinclair Co. for instance can pump crude from Casper, Wyo., to the Gulf of Mexico, also from its terminus near Chicago to the Gulf. With the acquisition of the Pure Oil Pipe Line Co., the Prairie Pipe Line Co. can send oil from Whiting, Ind., to the Gulf and through its connections crude could be piped from the Gulf through Texas, Oklahoma, Kansas, Nebraska, Illinois, Indiana, Ohio, Pennsylvania, New York and New Jersey to refineries on the Jersey Coast.

The Humble Pipe Line Co. pipes crude across Texas from the Big Lake Field to seaboard at Texas City.

Rerouting Crude

In the early days of the industry the refineries naturally centered close to the crude supply. Small plants were scattered throughout the Pennsylvania fields, the first commercial plants of importance being located at Titusville. Probably the first plant outside of the oil region was located at Corry, Pa., selected because it was a railroad center and enjoyed cheap tariffs. As pipeline transportation developed it was found more advantageous to locate refineries nearer the centers of population and where both rail and water rates could be secured. Thus early in the history of petroleum Bayonne, N. J., and Cleveland, Ohio, became refinery centers, with pipelines extending back into the Pennsylvania regions.

The New Jersey Coast has continued to maintain its position as a refinery center, but Cleveland has in a measure given way to Chicago. As the oil producing territory extended westward, the pipelines followed but the crude continued to be piped eastward through the old trunk lines to the Jersey Coast, each separate pipeline system exacting a toll for transporting the crude through its system. Thus Oklahoma crude went through the Prairie's lines to Whiting, the Indiana Pipe Line Co. lines to Ohio, the Buckeye lines to Pennsylvania, the National Transit Co. lines to New York state near Olean and the New York Transit Co.'s line to the Jersey Coast. This routing continues, but the amount of crude handled is decreasing. Instead, much of the crude now is piped to the Texas Gulf ports, such as Port Arthur, Sabine, Beaumont, Houston and Texas City and is sent to north Atlantic ports in tankers, carrying from 75,000 to 110,000 bbls. at a time. A large quantity is also sent out in tankers from Baton Rouge, La. It takes a tanker from six to eight days to make the trip north and the transportation cost is much less than if it was piped. The crude is delivered quicker than if it was piped across the country.

The increased amount of crude thus being rerouted is shown from the following figures from files of The Oil and Gas Journal:

First six months of 1922, 15,821,956 bbls.; first six months of 1923, 16,959,106 bbls.; first six months of 1926, 36,522,234 bbls.

The following major oil companies ship crude from Texas Gulf ports: The Texas Company, Gulf Refining, Magnolia Petroleum, Atlantic Oil Producing, Sun Oil Co., Vacuum Oil Co., Marland Oil & Refining, Pure Oil, Humble Oil & Refining, Sinclair Refining, Crown Central Oil Corp.

The Standard and its subsidiaries and The Texas, Gulf, Sun and Sinclair have their own fleet of tankers kept constantly in service between Gulf ports and Mexico and Atlantic Seaboard points and also crossing through the Panama Canal to the Pacific Coast refineries.

Cost of Lines

The cost of constructing trunk line systems has increased in proportion with the advance in materials and labor. Previous to the World War 8-inch trunk lines were laid for about $10,000 per mile, which included rights of way, pipe, ditching, connections, pumping stations and sites, tanks and telegraph and telephone lines. Today the cost of the same size line will average from $14,000 to $16,000 per mile. The cost is greater in the northern and western part of Texas where the country is rough than it is in the central and coastal region. Pumping stations are located closer in the northern and western sections than in the southern part of the state, due to the topography of the country.

OFFICIALS OF THE TEXAS PIPE LINE COMPANY

Left to right, back row: F. P. Dodge, T. J. McMahon, R. J. Daniel, O. R. Burden, J. B. Haden, J. H. Borchers and H. M. Snyder. Second row: B. C. Walker, C. O. Crouch, H. L. Stewart, O. E. Stimson, J. C. Colligan and W. A. Bohan. Front row: Charles Benson, T. J. Hannon, J. K. McGoldrick, B. E. Hull, J. L. Dowling, A. M. Donoghue, R. B. McLaughlin and J. B. Alleman.

Fluid Flow and Friction in Pipelines

History of Experimental Work Described, Mechanism of Flow Explained and Friction Loss Formulas Presented

By William G. Heltzel
Sinclair Pipe Line Co., Tulsa, Oklahoma

Until recent years the design of pipeline systems for transporting fluids have been based on empirical equations, which have been formulated from data collected on operating systems. This method of design proved erroneous very often due to the fact that the data used to formulate the equation were in no way germane to the conditions under which the new system was to operate. But through the research work of the last 15 years, along with the excellent work of the pioneer students of the hydraulics of fluids, there has been established a definite physical law by which the engineer can design a pipeline system rationally. It is the purpose of this paper to review briefly the important works on this subject from the time of Poiseuille to the present; for it is believed that such a presentation will offer a clearer understanding of the principles involved. The mechanism of flow will be described and formulas will be given for determining the friction loss in liquid flow.

*The Work of Poiseuille[1]

Among the early experimenters in hydraulics was Poiseuille[2] who was trying to arrive at some law for the flow of viscous fluids through capillaries. In his experiments, 40 capillaries of different diameters and lengths were used to measure the time of transpiration of a given volume of pure water, at a certain temperature, passing through the tubes under various conditions. Working on the assumption that the rate of flow through the tubes was influenced by the temperature, the pressure, the length and the diameter of the tubes, Poiseuille made these factors variable in his experiments. To determine the pressure relations, tubes of carefully measured diameters and lengths were used and the time of transpiration of a given volume of pure water at a certain temperature was observed for various pressures. The influence of the length of the tube was ascertained by using tubes of nearly constant diameter, a correction factor being allowed for the small variance in the diameter, and determining the time required for the transpiration of a given volume of pure water at constant temperature through tubes of different lengths at the same pressure. The relation of the diameter to the rate of flow was determined by using tubes of the same length but of different diameters, through which the time of transpiration of a known volume of pure water was observed at a constant pressure. The diameter of the capillaries in these experiments varied from 0.00139 centimeter to 0.0652 centimeter.

The conclusion of Poiseuille was, that for tubes of small diameter and of sufficient length, the rate of flow through them is directly proportional to the pressure and the fourth power of the diameter and inversely proportional to the lengths. The work of Poiseuille has been proven accurate, and his reliable data established the law of viscous flow which has been named in his honor.

Experiments of Darcy[3]

Darcy experimented with the flow of water in pipes, varying in diameter from 0.14 centimeter to 50 centimeters. His results showed that the pressure loss was proportional to some power of the mean velocity, a value approximating 1.92 or nearly equal to the whole number 2. In the case of Poiseuille's relation, the frictional loss is proportional to the first power of the velocity. The work of Darcy showed that there were two different regimes of flow, and the relation developed by Poiseuille was not universally true; his work indicated also that there was a condition of flow where the frictional resistance, according to his experiments, was almost proportional to the square of the mean velocity.

Reynolds' Experiments[4]

Reynolds was the first to show that there was a critical velocity in the flow of fluids in pipes where the one type of flow noted by Poiseuille in his work with capillaries, broke up and changed over through a transitional regime to the type of flow observed by Darcy in his work with larger pipes. Using glass tubes, Reynolds was able to show the two different regimes of flow by varying the rate of water flow through them and injecting a colored fluid into the stream. It was observed in these experiments that with low velocities of the stream through the tube, the colored stream of injected fluid moved through the tube without diffusing with the main body of the fluid. In fact Reynolds observed that any disturbance of the water in the feeding tank would be reflected in the colored band by undulating in the tube without eddying. It was apparent that the films of the fluid were shearing over each other and moving in a stream line or lamellar motion. This type of flow is known as "stream line flow." But by increasing the velocity, Reynolds observed that at 30 diameters from the entrance of the tube, the colored band broke up into eddies that filled the whole tube. Decreasing the velocity would cause the eddying motion to stop; but by increasing the velocity again, the sinuous or turbulent condition of flow would set in. This type of flow is generally known as "turbulent flow."

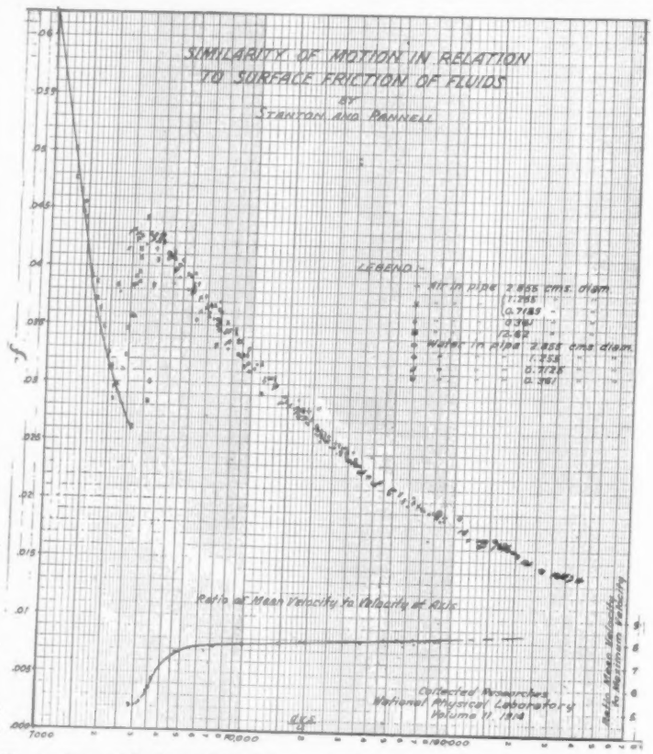
SIMILARITY OF MOTION IN RELATION TO SURFACE FRICTION OF FLUIDS
BY
STANTON AND PANNELL
LEGEND
Air in pipe 2.855 cms. diam.
Water in pipe 2.855 cms diam.
Ratio of Mean Velocity to Velocity at Axis
Ratio Mean Velocity to Maximum Velocity
Collected Researches
National Physical Laboratory
Volume 11. 1914

Fig. 1.—Curve of Stanton and Pannell, showing the results of their experiments to determine the similarity of motion in relation to surface friction of fluids.

Poiseuille's Law of Viscous Flow

The excellent work of Poiseuille in 1842, which established experimentally the law of viscous flow, gave a new impetus to the discussion of the viscosity of fluids, a factor concerning which little was known. In 1860, Hagenbach[5] defined viscosity and derived Poiseuille's law theoretically. In 1860, Helmholtz also published the derivation of this law from the equation of motions. These authors, corroborating Poiseuille's experimental law, showed that for stream line flow, considering the fluid of a constant temperature, the pressure loss can be determined from the length and the inside diameter of the pipe, the absolute viscosity and the mean velocity of the fluid. This law is expressed in Formula No. 1 below:

$$u = \frac{P_1 r^2 g}{8 v l} \qquad (1)$$

$$P_1 = \frac{8 v l u}{r^2 g} \qquad (2)$$

$$P = \frac{2 v l u}{9 g d^2} \qquad (3)$$

It will be seen from this formula that in stream line flow, the resistance is directly proportional to the viscosity and independent of the density. It is to be noted also that in this flow the friction loss is directly proportional to the first power of the velocity and inversely, as the square of the diameter of the pipe.

Experimental Work of Stanton and Pannell[7]

The experimental studies of Reynolds clearly indicated the existence of similar motion in pipes of different dimensions, but there remained yet the indefiniteness of the relation of flow of various fluids under different conditions. The existence of the similarity in the motion of fluids was predicted previously, but there were no data to prove it. However, the excellent work of Stanton and Pannell showed conclusively that there was a similarity in the motion of fluids having widely different viscosities and densities when these fluids flowed in containers of similar dimensions.

The work of Stanton and Pannell is one of the most important contributions to our knowledge of fluid flow in pipes. The results of their experiments are remarkably consistent and there can be no doubt as to their conclusions. Without discussing the procedure of the experiment and the details of the mathematics, it is believed necessary to show only the results. By experimenting with air and water flowing at different rates through smooth drawn brass pipe of different diameters, Stanton and Pannell obtained the results shown in Figure No. 1. The two different regimes of flow are clearly shown in this curve, also the point of critical velocity. In this curve the coefficient of friction "f" is plotted against the ratio dvs/u, in which d equals the diameter of the tube, v, the velocity of flow, s the density and u the absolute viscosity of the fluid. These curves will be discussed further under the Mechanism of Flow. The results of Stanton and Pannell, which did not show any greater variation than 2 per cent over the whole range for four different pipes, are the most consistent and their work has been confirmed by later experiments on different fluids.

Lander's Experiments[8]

The work of Stanton and Pannell showed in their water and air experiments that there was a similarity of motion in the flow of fluids in pipes and that the coefficient of friction was a function of the ratio, dvs/u. Later, Lander carried out some experiments on the flow of steam and water in new commercial steel pipe. In the water experiments steel pipe of the following diameters was used 0.42 inches and 1.30 inches. For the steam experiments, pipes of the following diameters were used—0.42 inches, 0.75 inches and 1.30 inches. Lander's data for commercial steel pipe, plotted in Figure No. 2 show that his coefficients of friction are higher than those of Stanton and Pannell for smooth brass pipe (Figure 1 and shown by curve "c-d" in Figure 2) but they follow the same trend. This is the very thing to be expected, because in the small pipe, the relative roughness of commercial steel pipe to smooth brass pipe would cause the higher friction factor in turbulent flow. However, it is somewhat surprising that Lander did not obtain coefficients of friction somewhat different for the respective sizes of pipe, considering the various pipes to have the same degree of roughness on the inside surface. The good consistency of Lander's results will be observed.

Experiments of Kite and Kennedy[9]

Experimenting with oils, Kite and Kennedy of the Massachussetts Institute of Technology, worked on the same theory as Stanton and Pannell, as well as Lander. These men experimented with the flow of petroleum in one-inch, two-inch and four-inch commercial steel pipe. The oils used were a 15.7 A.P.I. Mexican crude oil and a 25.0 A.P.I. Port Arthur crude oil. The results of these experiments showed a very good consistency, and although the results are not plotted they would fall near the curve of Lander. The results of Kite and Kennedy for the two and four-inch pipe show practically no variation from a general trend; however, the friction factor for the one-

*References will be listed according to the number in the bibliography and the nomenclature for the formulas will be found at the end of this paper.

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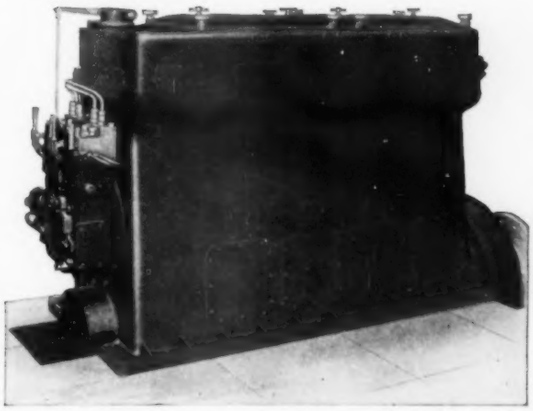

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inch pipe is consistently higher, and this is what could be expected. The curve of Kite and Kennedy, in the turbulent flow region, is higher than the Stanton and Pannell curve for smooth brass pipe; for the small sizes of pipe this should be true. This work confirmed that of Lander as well as that of Stanton and Pannell.

Commercial Oil Pipelines

In order to learn how the laws that had been developed by theory and experiment applied to commercial pipelines, the writer experimented to determine the friction loss in the transportation of a 37 A.P.I crude oil through 8-inch and 12-inch lines. It is not within the scope of this paper to describe the experiments, but some of the results are shown in Figure No. 2; these results are confined to the turbulent flow region. The data show a good consistency for pipelines in operation. It will be noticed that the values follow the trend of the Stanton and Pannell curve for smooth brass pipe of small diameter. These results are lower than those of Kite and Kennedy for oil in one-inch, two-inch and four-inch pipe, as well as the results of Lander and Saph and Shoder. It is believed that where commercial pipe of the same interior roughness is used, the smaller pipe should show the higher friction losses for turbulent flow, and that above a certain size of pipe, the friction loss becomes almost independent of the interior roughness of the pipe, acting the same as small smooth pipe. It is believed that the experiments with large sizes of pipe should give results similar to those obtained by Stanton and Pannell. There is no disagreement with the results of Kite and Kennedy as well as Lander; however, it is believed that their friction loss determinations are too high for the larger sizes of pipe.

Mechanism of Flow

All of this work has shown conclusively the existence of a similarity in the motion of fluids, flowing in similar containers under widely varying conditions. This work has covered fluids from gases to heavy viscous oils flowing in tubes, varying from very small sizes to pipe 12 inches in diameter. It has been thoroughly demonstrated also that there are the two regimes of flow and that the coefficient of friction is a function of the ratio, dvs/u. With this general principle established, the mechanism of flow should be considered next.

Further reference to Figure No. 1 will aid in explaining the modes of flow. This chart shows the two distinct branches of the curve, (repeated in Figure 2 and indicated there by the branches "a-b" and "c-d") each branch representing a condition of flow.

The values of "f," the coefficient of friction, corresponding to the values of the ratio dvs/u, which make up the curve "ab," follow a distinct trend and fall near the curve up to a value of about 2,000 on the abscissa, where the values of "f" change abruptly from the trend of the curve "ab" and become considerably higher at this point. The values of "f" between 2,000 and 2,500 follow no trend and are confused—this interval represents the transitional period from stream line to turbulent flow. It is interesting to note that for the smaller sizes of pipe, there is a tendency for stream line flow to persist beyond the value of 2,500, where for most cases in Stanton and Pannell's experiments turbulent flow sets in.

The branch "cd" of the curve begins with a higher value of "f" than at the end of the stream line flow curve, decreasing rather rapidly at first but becoming gradually parallel with the abscissa, which indicates the tendency of the value, "f," to become independent of the dimensions of the fluid as well as its temperature and to vary as the square of the velocity as the the ratio, dvs/u approaches some high value. The point at which the index law becomes effective has not been determined experimentally. The experimental results on curve, "cd," from the value 2,500 to 470,000 on the abscissa, with a few exceptions, show no greater variation than 2 per cent from the mean value for the various conditions. These data show a remarkable consistency considering the varying conditions, and the similarity of the motion of fluids in this region is thoroughly demonstrated.

Critical Velocity

It appears from the Stanton and Pannell data that the transition from stream line flow to turbulent flow occurs in the range from 2,000 to 2,500 on the abscissa. There is, however, an indication of a tendency for stream line flow to persist beyond the critical velocity for small pipe. This work would indicate that the critical velocity sets in at about 2,000 on the abscissa, and that a post critical velocity, or the point at which turbulent flow begins, is at about 2,500 on the abscissa. However, the experimental work carried out at the Massachussetts Institute of Technology on one-inch, two-inch and four-inch commercial steel pipe with oil indicates that the critical velocity sets in as low as 930 for the ratio dvs/u; this work also indicates transitional values of "f" for a region between approximately 930 and 3,100 on the abscissa. These experiments showed a wider range of limits for the transition from stream line flow to turbulent flow than was indicated in the work of Stanton and Pannell. It is believed that there is no inconsistency here, for turbulence would probably be set up in the small sizes of commercial pipe earlier than for smooth brass pipe of the same size. The roughness of the pipe is a factor in determining the critical velocity. In the case of the large pipe, however, it is believed that the transitory region will conform with the observations of Stanton and Pannell for smooth brass pipe, since the roughness of the large pipe will be a small factor compared with the smaller sizes of pipe. There is a possibility also that the pulsation of pumps or any disturbance at the source will aid in setting up a critical velocity at a lower value of the ratio dvs/u than where the source is under a steady and non-impulsive head.

Stream Line Flow

In homogeneous fluids, stream line flow is characterized by smooth continuous flow of one concentric cylindrical film of the substances over the other in a direction parallel with the axis of container. In such a condition of flow, there is a film of the substance which wets the perimeter of the container and clings to it—over this move superimposed cylindrical films, shearing over each other in a concentric fashion and at a rate depending upon their relative viscosities. The branch "ab" of the curve has the form of a rectangular hyperbola, which from the chart is expressed by the equation[10] below:

$$\frac{f\,dvs}{u} = 64 \qquad (4)$$

in which "f" is the ordinate and dvs/u is the abscissa.

Roughness of the Pipe As It Affects Resistance to Flow

It appears that from an examination of experimental data and an analysis of stream line flow, the roughness of new commercial steel pipe, has a negligible effect upon the resistence to stream line flow. Graphical representation of experimental data obtained to show the relation of the coefficient of friction, "f," to the ratio, dvs/u, for stream line flow in pipes of different degrees of roughness indicates that all of the points fall nearly on the same smooth curve. This would indicate that the roughness of the pipe is a negligible factor in stream line flow; however, this is not the case for turbulent flow.

Viscosity As a Factor in Stream Line Flow

In view of the nature of stream line flow, which is a shearing process, the viscosity is the determining factor in the friction loss and the density of the fluid is a negligible factor. Since temperature has such an important effect on the viscosity of the fluid, it will in turn be a material factor affecting the friction loss in the stream line flow. And temperature as an influencing factor will decrease as the viscosity decreases.

Turbulent Flow

Turbulent flow, which is represented by the curve "cd" is characterized as an eddying mass of fluid in which the particles are following various and confused paths. In this condition of flow, the density of the fluid influences the resistence to flow rather than the viscosity of

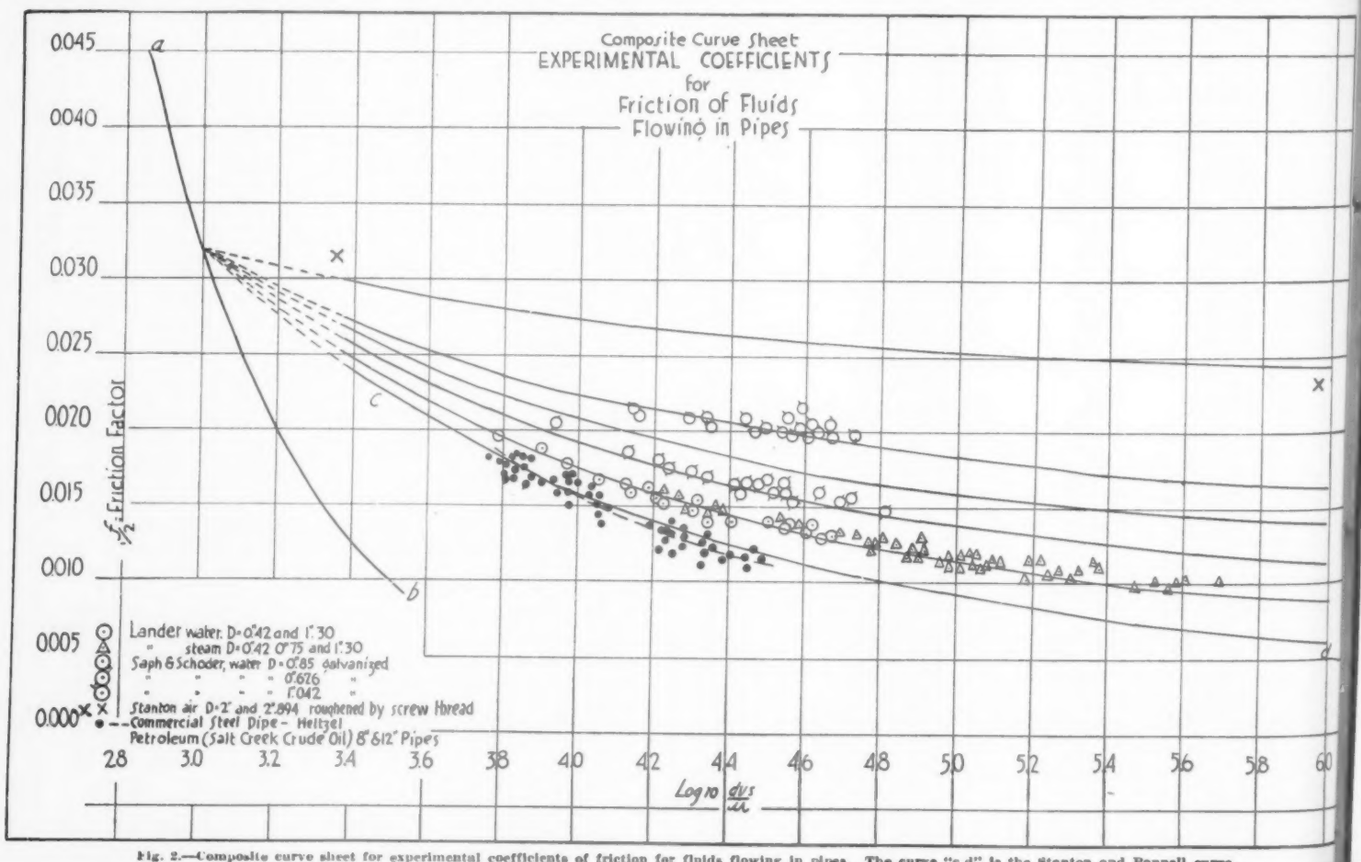

Fig. 2.—Composite curve sheet for experimental coefficients of friction for fluids flowing in pipes. The curve "c-d" is the Stanton and Pannell curve.

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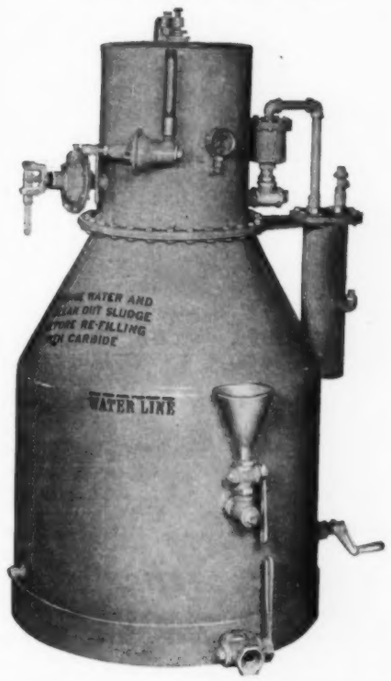

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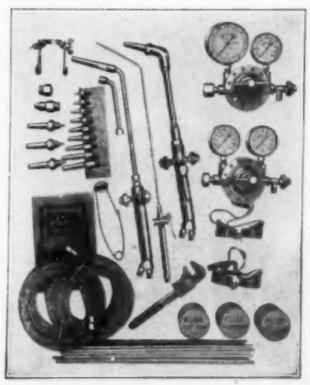

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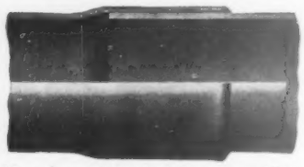

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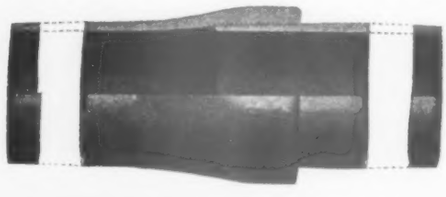

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the fluid, in view of the fact that the fluid is now eddying, and the particles are moving in paths that hinder and obstruct lineal flow by impact and collision. The roughness of the pipe, especially in the smaller sizes, will affect the resistence to turbulent flow. No analytical equation can be given for this part of the curve, "cd," and the coefficient of friction for any value of the ratio, dvs/u, must be taken from the curve. The error in many of the formulas of the past has been due to the fact that equations have been formulated from data which represented only a small part of the curve "cd." The reason for many different equations and the discordance has been due to the fact that the experimenters obtained data at different places on the curve.

Ratio of Mean Velocity to Axial Velocity

The theory of stream line flow shows that the mean velocity across the section of a tube is 0.5 the axial or maximum velocity—this has been corroborated by experiment. Stanton and Pannell experimented with water flowing through tubes 0.7125 and 2.855 centimeters in diameter, also with air flowing through tubes 0.7125, 2.855 and 1.255 centimeters in diameter. The curve in the lower part of Figure 1 shows the calculated values of the ratio of the mean velocity to the maximum velocity, plotted against the ratio dvs/u. This work shows that the ratio of mean velocity to the maximum velocity varies from 0.5 near 2,500 on the abscissa to about 0.81 at 70,000.

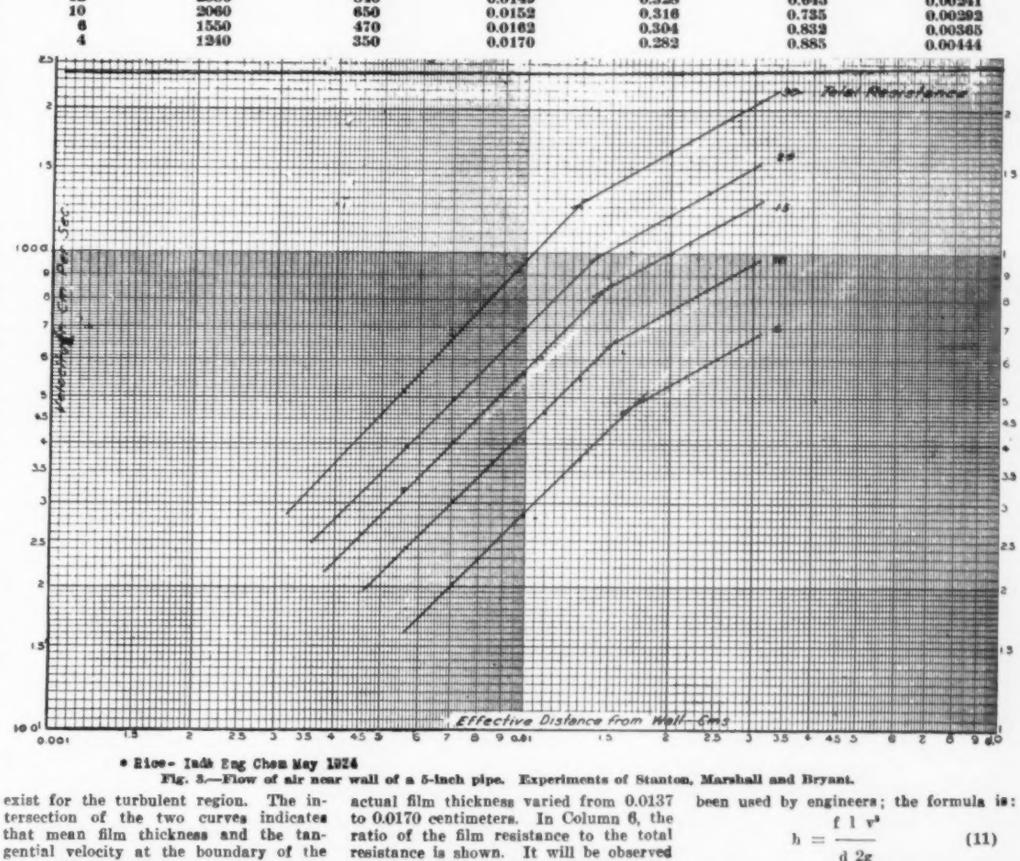
Stream Line Flow Near Walls of Pipe

It was believed that in turbulent flow there existed a film of the fluid which moved in a stream line fashion along the wall of the pipe. This assumption was justified later by Stanton, Marshall and Bryant[11], who experimented with air flowing through a five-inch pipe. These experimenters were able to measure the velocities near the wall of the pipe at intervals of several thousandths of an inch by specially designed pitot tube. Rice[12] in his paper on "Forced Convection of Heat in Gases and Liquids," has prepared an interesting table and chart from the data of Stanton, Marshall and Bryant. Figure No. 3 gives the table and the curves prepared by Rice to show the relation of the velocity to the distance from the wall for fixed resistances. It is noteworthy that near the wall of the pipe the velocities are proportional to the distance from the pipe surface, which gives the parallel 45-degree lines that indicate stream line flow. From the curves, it will be seen that at a given distance from the pipe, there is a break from the 45-degree line, and another set of lines

FLUID FLOW NEAR WALL OF PIPE

TABLE NO. 1—BY RICE*

1 Total Resistance Dynes per Sq. Cm.	2 Mean Velocity Cms/Sec.	3 Velocity at Film Surface Cm/Sec.	4 Actual Film Thickness Cm.	5 Velocity, Film / Velocity, Mean	6 Film Resistance / Total Resistance	7 Effective Film Thickness / Diameter
30	3760	1280	0.0137	0.340	0.538	0.00177
20	3000	980	0.0142	0.326	0.595	0.00213
15	2580	840	0.0149	0.328	0.645	0.00241
10	2060	650	0.0152	0.316	0.735	0.00292
6	1550	470	0.0162	0.304	0.832	0.00365
4	1240	350	0.0170	0.282	0.885	0.00444



* Rice—Indl Eng Chem May 1924

Fig. 3.—Flow of air near wall of a 5-inch pipe. Experiments of Stanton, Marshall and Bryant.

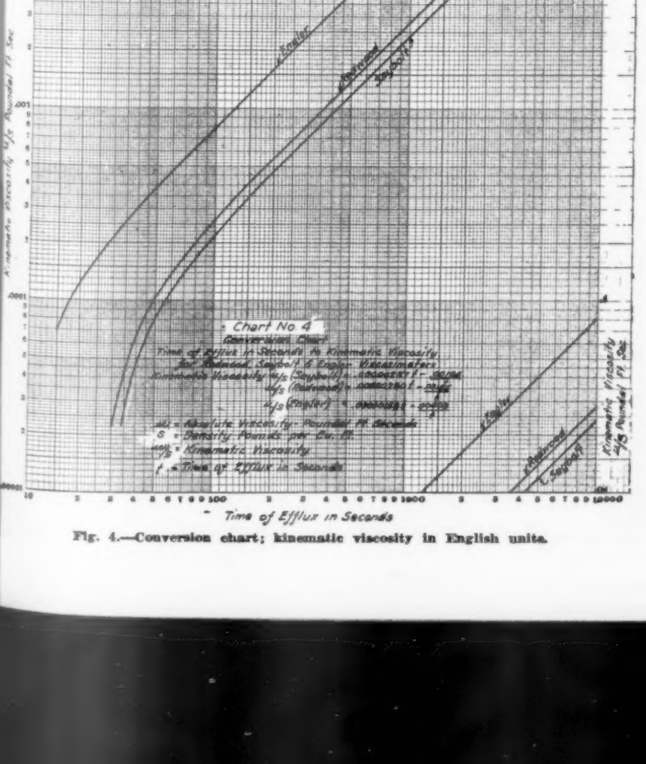

Degrees Engler
Time of Efflux in Seconds
Chart No. 4
Conversion Chart
Time of Efflux in Seconds to Kinematic Viscosity
for Redwood, Saybolt & Engler Viscosimeters

Fig. 4.—Conversion chart; kinematic viscosity in English units.

exist for the turbulent region. The intersection of the two curves indicates that mean film thickness and the tangential velocity at the boundary of the film. This fact points out that in turbulent flow there is a region near the surface of the pipe in which the fluid is moving in a stream line fashion. In the table, column No. 5, it is noteworthy that the ratio of the maximum film velocity to the mean velocity varies little. In column 4, it will be observed that the actual film thickness varied from 0.0137 to 0.0170 centimeters. In Column 6, the ratio of the film resistance to the total resistance is shown. It will be observed that for high velocities, about 0.5 of the energy is used in overcoming the viscous film shear, and the remainder in the turbulent flow. At the lower velocities the film friction increases to 0.885. Column No. 7 gives the ratio of the effective film thickness to the diameter.

Formulas

Stream Line Flow in Practical Terms. The law of Poiseuille is shown below expressed in the more practical terms of barrels per hour, cubic feet per second and the diameter of the pipe in inches. The expression can be easily converted into gallons per minute and pounds per hour, expressions that are used for the flow of water, gasoline, and steam.

$$\text{Expressing } P = \frac{2vul}{9gd^2} \qquad (3)$$

in terms of barrels per hour, and diameter in inches.

$$P = 0.28413\ \frac{Bu}{D^4} \text{ per 1 foot length} \qquad (5)$$

$$P = 284.13\ \frac{Bu}{D^4} \text{ per 1,000 feet} \qquad (6)$$

$$P = 1500\ \frac{Bu}{D^4} \text{ per mile} \qquad (7)$$

Expressing the equation in terms of cubic feet per second instead of barrels per hour, the following equations are obtained:

$$P = 182.2\ \frac{Qu}{D^4} \text{ per 1 foot} \qquad (8)$$

$$P = 182200\ \frac{Qu}{D^4} \text{ per 1,000 feet} \qquad (9)$$

$$P = 962000\ \frac{Qu}{D^4} \text{ per mile} \qquad (10)$$

Turbulent Flow Formula

Since the work of Reynolds, it has been known that the laws of Poiseuille for stream line flow did not hold true for the turbulent regime. However, for turbulent flow, the Fanning formula has been used by engineers; the formula is:

$$h = \frac{f\ l\ v^2}{d\ 2g} \qquad (11)$$

This formula proved to be fundamentally correct, but there was no way of determining the value of "f," and arbitrary values were chosen by engineers for the varying conditions, previous to the work of Stanton and Pannell.

Buckingham's Mathematical Proof

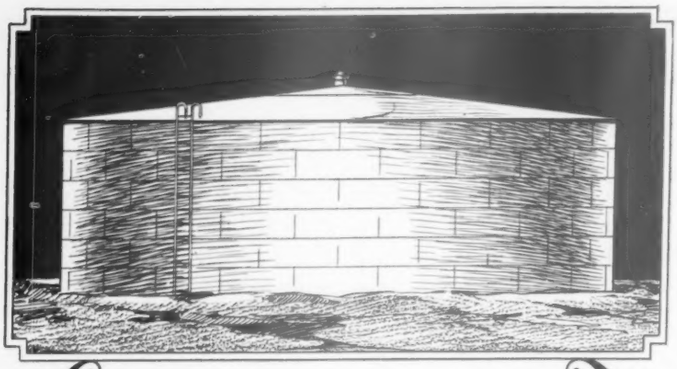
Soon after Stanton and Pannell showed experimentally that the coefficient of friction is a function of the ratio dvs/u, Buckingham[13], of the United States Bureau of Standards, showed mathematically by dimensional reasoning that the coefficient of friction is a function of the dimensionless expression dvs/u. In Buckingham's paper, presented to the A. S. M. E. in 1915, he showed that the friction loss could be expressed rationally by the equation:

$$h = \frac{l\ v^2}{d\ 2g}\ \phi\ \left(\frac{dvs}{u}\right) \qquad (12)$$

This corroborated the Fanning formula and the work of Stanton and Pannell. This equation has the form of the Fanning formula, and in fact it is only an extension of the equation to describe and analyze the value "f." It showed that "f" was some function of the ratio dvs/u and the relation would have to be determined experimentally. The work of Stanton and Pannell and that of later experimenters have supplied the experimental data as described above to prove the existence of the fundamental law, and to make the choice of the coefficient of friction in the above equation rational. Theoretically and experimentally it has been shown that the resistance to the flow of a fluid expressed in pressure or head loss is—

$$h = \frac{f\ l\ v^2}{d\ 2g}$$

If the value of "f" (f dvs/u = 64) as determined from the curve of Stanton



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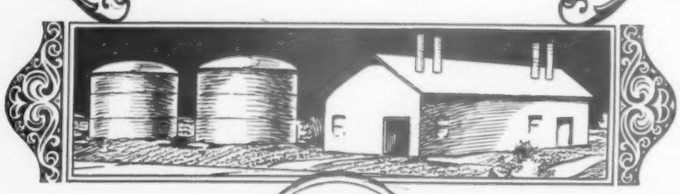

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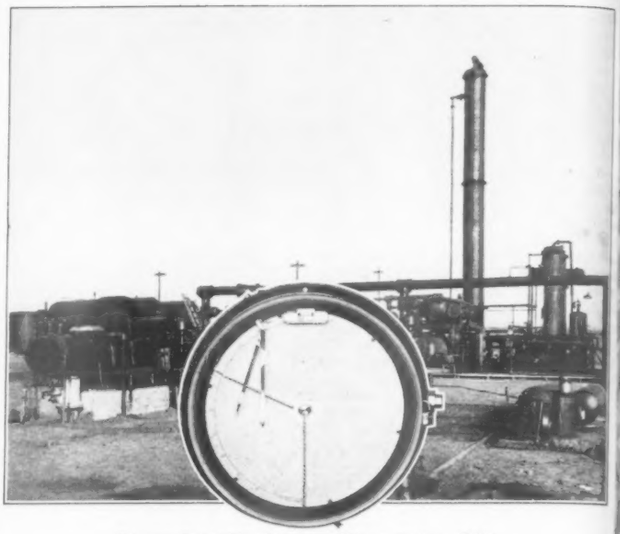

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and Pannell is substituted in the above equation, the fundamental formula of Poiseuille is arrived at as expressed for stream line flow above:

$$h = \frac{8\ v l u}{r^2 g s}$$

$$\text{or } P = \frac{2\ v\ l\ u}{9\ g\ d^2}$$

Turbulent Flow Formula in Practical Terms

It is to be noted that in equation No. 11, which covers the regime of turbulent flow, the head lost is directly proportional to the square of the velocity and inversely proportional to the first power of the diameter. In this regime of flow the density is the important factor, and the viscosity becomes a negligible quantity. No algebraic equation can be given to cover the friction loss over the range of turbulent flow, and the value of "f" must be obtained from the coefficient of friction chart showing the relation between "f" and the ratio dvs/u. The above expression is not empirical; it is a true physical analysis of the relation of the various factors involved in the flow of viscous fluids in pipes, and the value of "f" in the equation can be chosen rationally. Expressing equation No. 11 in terms of pressure in pounds per square inch, barrels per hour, cubic feet per second, diameter in inches, and density in pounds per cubic feet, the following equations are obtained:

$$P = 0.0001057\ f\ \frac{B^2 s}{D^5} \text{ per foot} \quad (13)$$

$$P = 0.10574\ f\ \frac{B^2 s}{D^5} \text{ per 1,000 feet} \quad (14)$$

$$P = 0.55830\ f\ \frac{B^2 s}{D^5} \text{ per mile} \quad (15)$$

Expressing B in terms of Q (cubic feet per second)—

$$P = 43498\ f\ \frac{Q^2 s}{D^5} \text{ per 1,000 feet} \quad (16)$$

$$P = 229{,}610\ f\ \frac{Q^2 s}{D^5} \text{ per mile} \quad (17)$$

It is evident that the pressure loss can be determined if the value of "f" for the given conditions is known. The value "f" depends upon the ratio of the variables in the dimensionless expression dvs/u, and this value of "f" is always the same for a given numerical value of the ratio regardless of how the constituent variables might change, provided they change in the same units. For example, if the numerical value of the ratio is 8,000 and the corresponding value of "f" is 0.034, and some of the variables of the ratio are now changed but in such a way as to give the same value 8,000 for the ratio, the value of "f" remains 0.034, regardless of the changed individual variables. With the value of "f" to be determined and knowing the diameter of the pipe and the velocity of the fluid it remains for the density and the viscosity to be determined in order to calculate the friction loss.

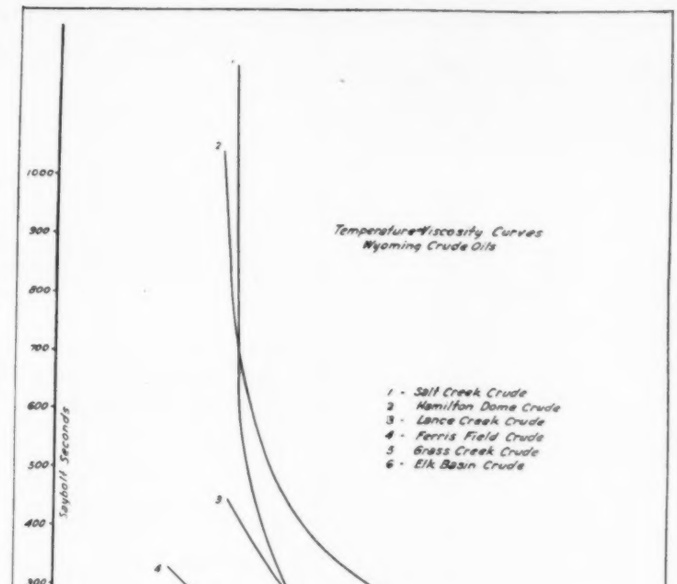
Temperature-Viscosity Curves
Wyoming Crude Oils
Saybolt Seconds
Temp. ° F.
1 - Salt Creek Crude
2 - Hamilton Dome Crude
3 - Lance Creek Crude
4 - Ferris Field Crude
5 - Grass Creek Crude
6 - Elk Basin Crude

Fig. 5.—Temperature viscosity curves for Wyoming crude oils.

Determination of Density

The A.P.I. scale is generally used in the United States to express the gravity of petroleum, and for practical purposes the hydrometer may be used to obtain the gravity which can be converted into density. The relation between specific gravity of petroleum and the A. P. I. degrees is expressed by the equation:

$$(18) \quad \text{Sp. Gr. } 60°F/60°F. = \frac{141.5}{131.5 \text{ plus A.P.I. degrees}}$$

Viscosity and its Definition

Viscosity may be defined as the force necessary to move a plane surface of unit area past a similar surface at a unit distance apart, and at a unit rate of speed, with the space between filled with a viscous fluid, the viscosity of which is to be determined. In brief, the viscosity is the internal resistance of the fluids. Different methods have been used to measure the viscosity of fluids, but a convenient and reliable procedure makes use of a long tube of small bore through which the liquid is caused to flow at a low velocity and in a stream line fashion, under a low gravity head in order to avoid eddying. Stream line flow has been discussed above, showing how the concentric films of oil shear over each other from the film which wets the interior wall of the pipe to the center of the pipe at varying rates which depend upon the resistance of the fluid at the concentric points. The total resistance is determined by integrating the sum of all the resistances from the wetted perimeter to the axis of the flowing fluid and equating it to the pressure or the gravity head minus the velocity head, since all of the energy is used up in the friction of the flow except that small part of kinetic energy. The stream line flow in a capillary tube can be expressed most simply by the following equation, which is due to Poiseuille:

$$u = \frac{s\ r^2 g\ h}{8\ v\ l} \quad (19)$$

Method of Determining Viscosity

The use of the long capillary tube and all of its refinements for determining

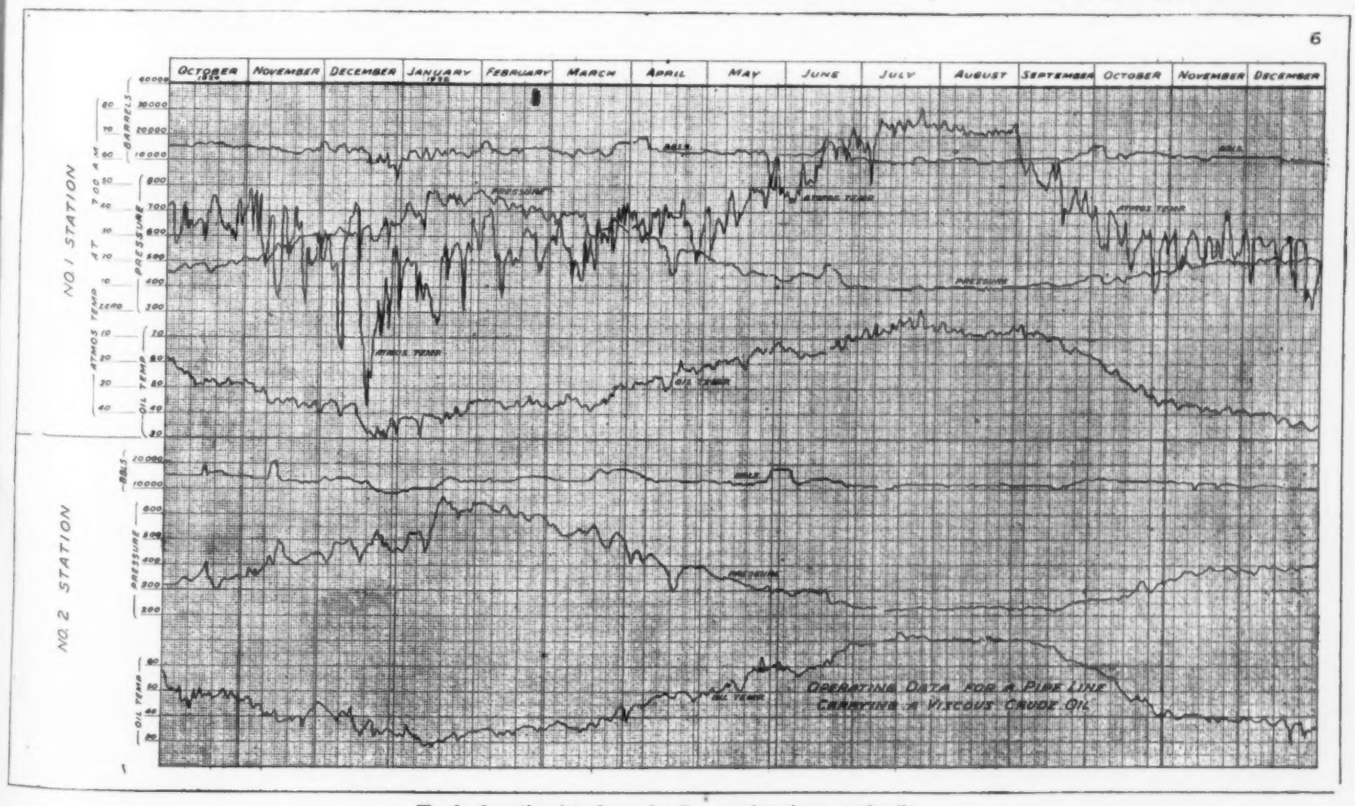

Fig. 6.—Operating data for a pipe line carrying viscous crude oils.

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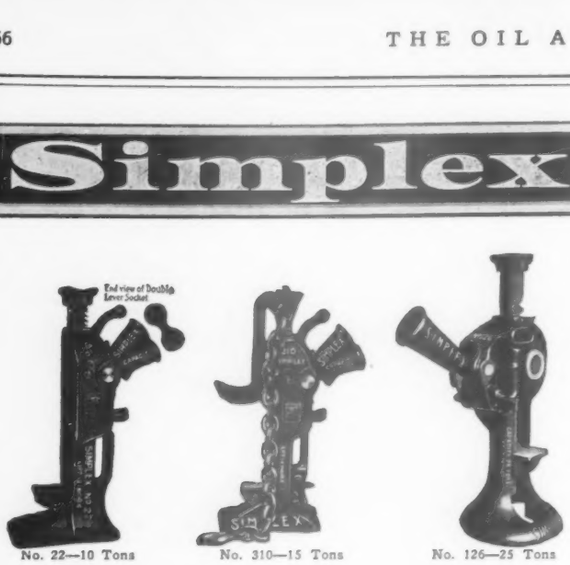

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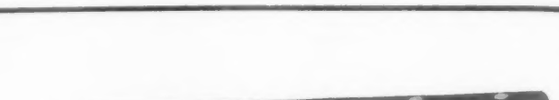

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the viscosity is more of a physical laboratory procedure than a commercial one. But there have been developed various types of commercial instruments for the measurement of the viscosity of liquids; among these are the Universal Saybolt, the Redwood, the Engler and the Furol Saybolt instruments. These viscosimeters make use of the time required for a known volume of liquid to flow through them, and they are calibrated for the absolute viscosity. The Saybolt instrument has been standardized and it is known as the Saybolt Universal Viscosimeter; this is the instrument which is used generall in the United States. This instrument has been calibrated by the National Bureau of Standards, and the work of Hershel[4] has been published in Technologic Paper No. 112. These commercial instruments really measure the kinematic viscosity.

$$\text{Saybolt Universal } \frac{u}{s} = 0.00000237\ t - \frac{0.00194}{t} \quad (21)$$

$$\text{Engler Viscosimeter } \frac{u}{s} = 0.00000158\ t - \frac{0.00403}{t} \quad (22)$$

$$\text{Redwood Viscosimeter } \frac{u}{s} = 0.00000280\ t - \frac{0.00185}{t} \quad (23)$$

in which equations, u/s equals the kinematic viscosity in English units.

From the above equations, the curves in Figure No. 4 have been computed. This chart can be used to convert from the time of efflux to the kinematic viscosity in foot-poundal-second or English units.

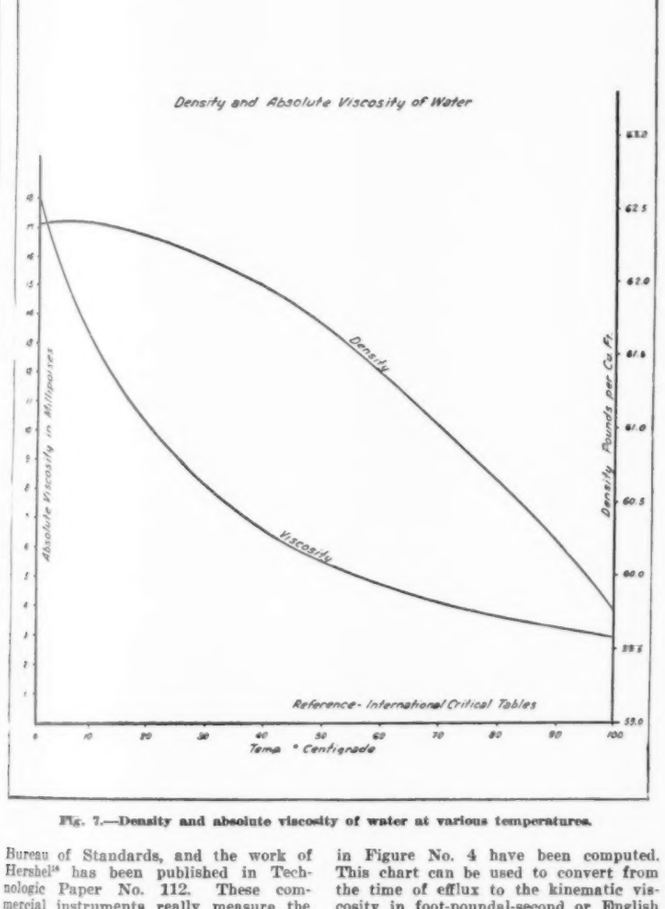

Fig. 7.—Density and absolute viscosity of water at various temperatures.

Kinematic Viscosity

The kinematic viscosity is the ratio of the absolute viscosity to the density; it is determined by a calibration equation for the various instruments. The calibration equation for the Saybolt Universal Viscosimeter, expressing the kinematic viscosity in terms of poises, is—

$$\frac{U_m}{S_m} = 0.00220\,t - \frac{1.80}{t} \quad (20)$$

where

U_m equals the absolute viscosity in dynes per sq. cm.

S_m equals density in grams per cubic centimeter.

t equals time Saybolt seconds.

The absolute viscosity can be determined by multiplying the kinematic viscosity value by the density, using similar units.

The Redwood and the Engler instruments are used in foreign trade for measuring the kinematic viscosity; they are based on the same principle as the Saybolt instrument. The relation of the kinematic viscosity in English units to the time required for the liquid to flow through the respective instruments is expressed in the following equations:

Specific Viscosity

Sometimes the viscosity is expressed as specific viscosity. The viscosity of water at 68 degrees Fahrenheit is one centipoise and the viscosity in centipoises is expressed sometimes relative to water.

Units of Measurement

The absolute viscosity is expressed in terms of poises (dynes-cms-secs) or in centipoises (centipoises equals 1/100 poise). In the English system, the absolute viscosity is expressed in foot-poundal-second units.

Conversion of Viscosity Units

The absolute viscosity, in terms of poises (dynes per square centimeters per second) is converted into the foot-poundal second units by dividing the absolute viscosity in C. G. S. units by 14.88. The kinematic viscosity is converted from the C. G. S. units to the English system by dividing the C. G. S. values by 929.03 and vice versa.

Temperature Viscosity Curves

It has been pointed out that temperature has a material effect on viscosity. It is necessary, therefore, in making a viscosity test to extend it over the operating temperature range of the oil in the pipelines. Viscosity runs should be made for constant temperature conditions, and a temperature-viscosity curve should be plotted from these data. From such a curve, the viscosity can be taken for any temperature and the value used in the formula. Figure No. 5 shows some temperature viscosity curves which indicate a wide variance. It is evident that with some crude oils, no trouble would be experienced in handling the oils at different temperatures, while with other crudes a temperature change would make it difficult to handle the oil. Curve No. 1, Figure No. 5, shows a viscosity curve for the Salt Creek crude oil. Curve 6 shows the viscosity of an Elk Basin crude oil. It is evident from this chart that trouble would be experienced in handling the crude oils represented by Curves Nos. 1 and 2; these curves are typical of crude oils having a high percentage of paraffin. The crude oils represented by Curves 5 and 6 should show little change in friction loss when transported under changed temperature conditions; such crude oils as these usually have a high percentage of gasoline. The asphaltic base petroleums will show consistently higher viscosities than the paraffin base crude oils. The importance of having a temperature-viscosity curve is indicated in Figure No. 6 which shows graphically some actual operating conditions in a pipeline throughout the year. Four curves are shown for two different pumping stations which are handling a viscous crude oil. There is the curve representing the crude oil delivery per 24 hours, the pressure at the stations, the oil temperature and the atmospheric temperature. Note the rather constant delivery curve and the increasing pressure curve with the decreasing oil temperature curve. Note the comparative interval between the summer and winter pressures and oil temperatures. It will be observed that the maximum pressure lags the minimum oil temperature.

Fluidity of Gasoline and Kerosene

Of passing interest some viscosities are shown in this paper for some other liquids, vapors and gases. Figure No. 8 shows the fluidities of gasolines of various gravities and also the fluidity of a kerosene. The fluidity is the reciprocal of viscosity in poises.

Viscosity and Density of Water

In the friction loss calculations for the flow of water, the viscosity of the water is neglected; however, the viscosity should be taken into consideration. Figure No. 7 shows the temperature viscosity curve, also the temperature density curve for water.

Viscosity of Gases

Whereas an increase in the temperature of liquids causes a decrease in the viscosity, the reverse is true for gases; the viscosity of gases is independent of pressure which affects the density. Figure No. 9 shows the temperature viscosity curves for air and steam.

Effect of Pressure on the Viscosity of Liquids

Bridgman[5] experimented with 43 liquids, determining the viscosity in the pressure range between atmospheric and 12,000 Kg. sq. cm. and at temperatures of 30 and 75 degrees Centigrade. It was found that the viscosity of water decreased with rising pressure at low temperatures and pressures; but at temperatures above 25 degrees Centigrade, the viscosity increased with the pressure. The viscosity of the other liquids increased linearly with the pressure. It was found that above a pressure of 1,000 kilograms per square centimeter, the viscosity increased rapidly. Bridgman concludes that the effect of pressure on viscosity is greater than on any other physical property hereto measured and varies more with the nature of the substance. Bridgman observes also that the pressure effect is greater on liquids made up of the more complicated molecules. Some data from the lubrication tests of the National Physical Laboratory on the variation of the viscosity with the pressure show that for Mobile "A" oil the viscosity varied 17 per cent at 0.471 tons from atmospheric pressure and 52.5 per cent at 1.455 tons per square inch. For Mobile "BB" oil the variation was 5.5 per cent at 0.471 tons and 53.5 per cent at 1.455 tons. It appears that if pres-

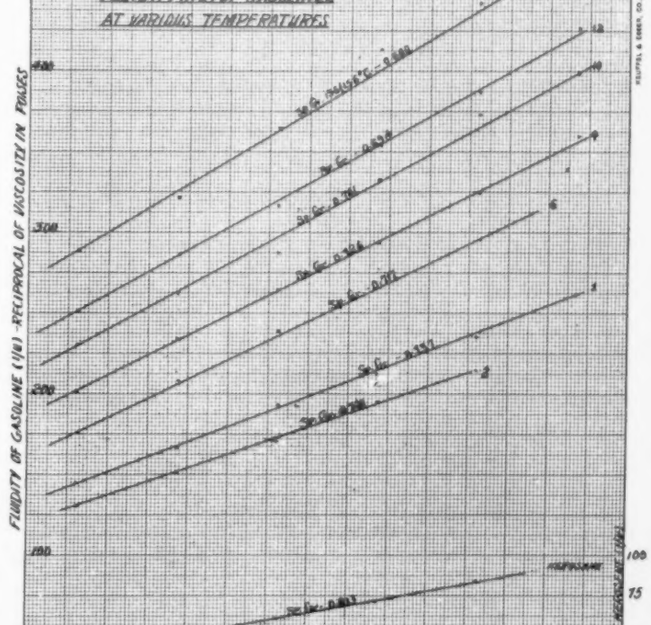
FLUIDITY (1/M) OF GASOLINES AT VARIOUS TEMPERATURES
FLUIDITY OF GASOLINE (1/M) - RECIPROCAL OF VISCOSITY IN POISES
REFERENCE TABLES - U.S. Bureau of Standards
TEMPERATURE DEGREES C

Fig. 8.—Fluidities of gasolines at various temperatures.

sure has any appreciable effect on the viscosity of crude oils, it might be advisable to loop pipelines on the low pressure end for pumping very viscous oil. It is regretted that no data are available for the pressure effect on the viscosity of crude oils at pipeline operating pressures.

Mixing Petroleums to Reduce the Viscosity

The viscosity of crude oils can be reduced by mixing with them portions of a less viscous petroleum. Very satisfactory results can be obtained where this condition can be accomplished, and there is no undesirable feature in the mixing of the crude oils. Figure No. 10 shows the results of mixing in different proportions of Salt Creek crude oil, which has a high viscosity at low temperatures, with a composite sample of Mid-Continent oil, which has a relative low viscosity.

Heating Crude Oils to Reduce the Viscosity

In transporting crude oils in pipelines, it becomes necessary, in the case of very viscous oil to heat it before it is pumped through the pipeline. The economical temperature to which the oil should be heated is that temperature just beyond the point where the temperature viscosity curve begins to become parallel with the temperature axis, for to heat it much beyond this point only adds heat to the fluid to be lost in the first several miles of the pipeline, with little or no benefit derived from the added heat in reduced viscosity. Where petroleums are to be heated in transit, the heating should be done under pressure, in closed heaters rather than in tanks; for the heating under atmospheric pressure will cause a high evaporation loss and consequently a higher viscosity at any given temperature than before it was heated. The heating of petroleum to reduce the viscosity before pumping it into the pipelines will be found costly, and where it is possible, as in the case of some high paraffin base crude oils, and conditions warrant, it might be more economical to use large lines and pump the oil cold, than to use a small line and heat the oil. There

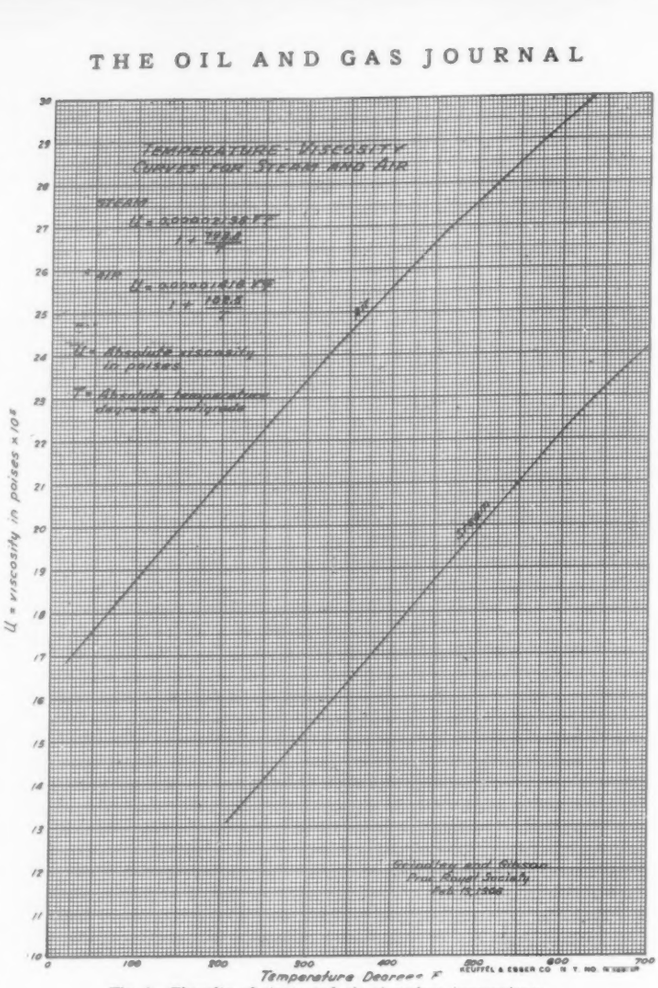

Fig. 9.—Viscosity of steam and air at various temperatures.

are crude oils, however, that cannot be transported through pipelines without heating it first.

Economy of Heating the Oil When Flowing Stream Line and Turbulently

Since the viscosity is an important factor in determining the friction loss in stream line flow, and an increase in the temperature of the liquid will decrease the viscosity, it will be found that the heating of the petroleum has its application only in this regime of flow. It is not economical to heat petroleum when flowing turbulently; for little benefit will be derived, since in turbulent flow the friction is independent of the viscosity and dependent upon the density.

Recommended Curves for the Value of "f"

Formulas have been presented in this paper for the calculation of the friction loss. In the turbulent flow formula, there is found the factor "f" the coefficient of friction, the value of which must be taken from a chart. The choice of the coefficient of friction can be made rationally, and the curves shown in Figure No. 11 are submitted as the recommended coefficient of friction curves. The Lander curve which conforms closely with the data of Kite and Kennedy is recommended for steel pipe six inches in diameter and smaller, and the Stanton and Pannell curve, which conforms with the writer's data for 8 and 12-inch commercial steel pipe, is recommended for pipe 8 inches and larger. It is the writer's belief that for commercial steel pipe, there will be a family of curves which will follow the trend of the Stanton and Pannell curve, but laying higher, or possibly lower than it, depending upon the size of the pipe. The smaller pipe, with practically the same degree of roughness as the larger pipe should give consistently higher values for the coefficient of friction. It is believed also that above a certain diameter the roughness factor of new commercial steel pipe will be small and negligible. In view of the available data, it is logical to recommend the higher curve for the smaller sizes of pipe and the Stanton and Pannell curve for the large sizes of pipe. There is some question as to the coefficient of

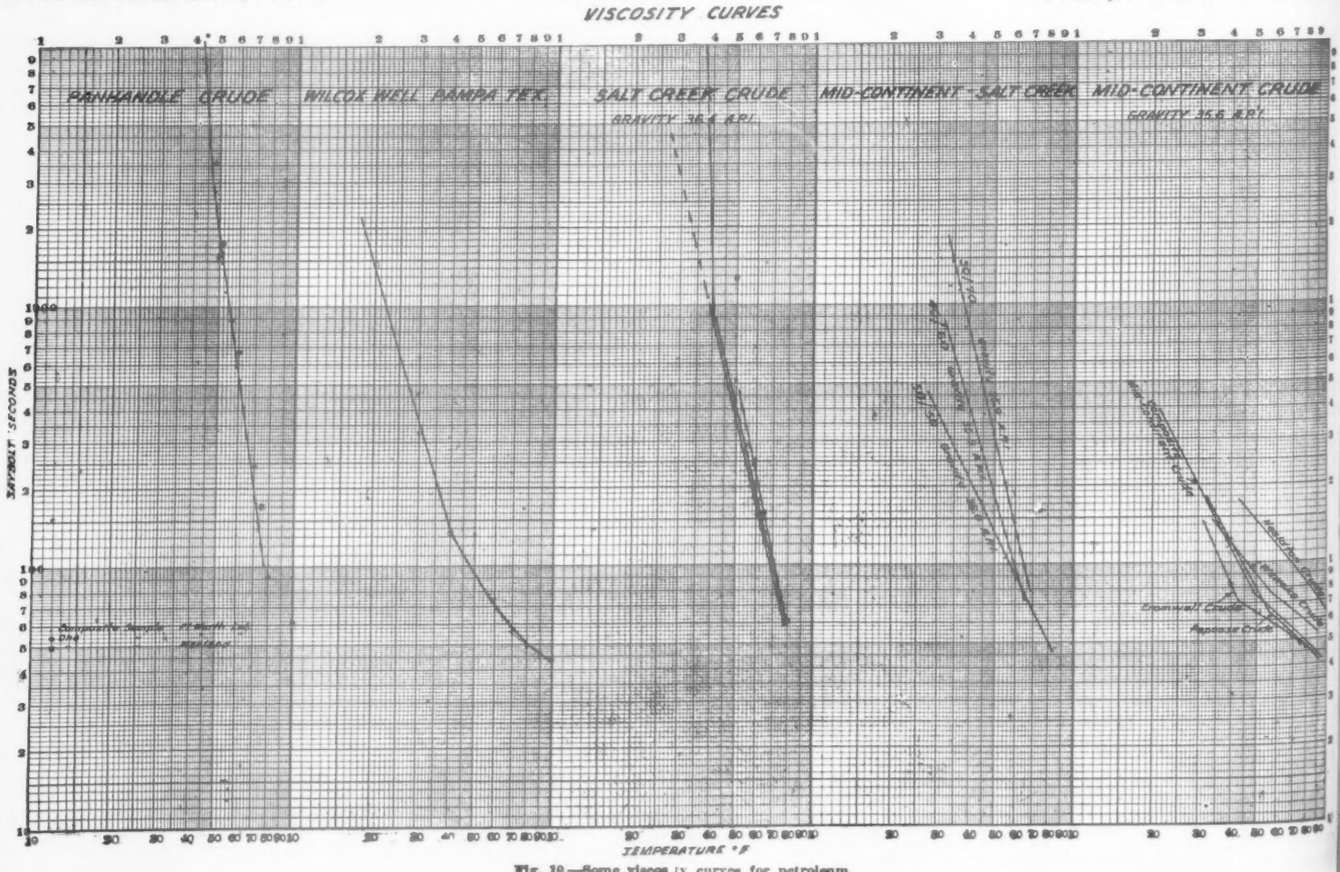

Fig. 10.—Some viscosity curves for petroleum.

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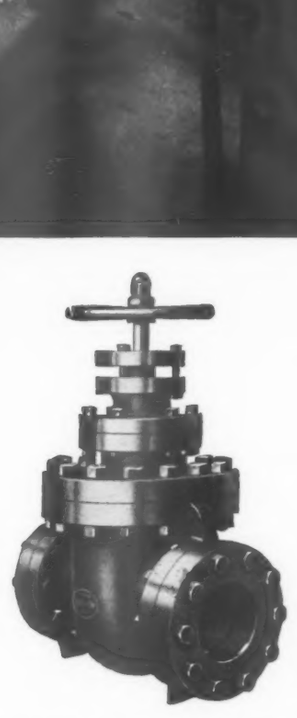

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friction values in the transitional regime, and there is some indefiniteness as to where the stream line flow ends, and for this reason the turbulent flow curve has been dotted over this interval to a point on the stream line flow curve. Where the value of the ratio falls in the transitional regime, it is believed advisable to obtain the coefficient of friction value from the dotted curve, rather than from the lower part of the stream line flow curve.

Diameter of Pipe in Formulas

In the use of the formulas for the determination of the friction loss care should be taken to use the actual inside diameter of the pipe, because an error would be introduced by using the nominal diameter raised to the fourth or fifth power. In Table No. 2 will be found the various factors for the pipe diameters to be used in the formulas.

Table No. 2—Diameter Factors to Be Used in Formulas

Nominal Diameter Inches	Inside Actual Diameter Inches D	D^4	D^5
1.0	1.049	1.211	1.270
2.0	2.067	18.25	37.73
3.0	3.068	88.60	271.8
4.0	4.026	262.7	1058.0
6.0	6.065	1353.0	8206.0
8.0	8.071	4243.0	34250.0
8.0	7.981	4057.0	32380.0
10.0	10.192	10790.0	109980.0
10.0	10.136	10560.0	106990.0
10.0	10.020	10080.0	101000.0
12.0	12.090	21370.0	258300.0
12.0	12.000	20736.0	248800.0
16.0	15.250	54200.0	825100.0

Procedure in Solving Problem

Consider the case of determining the pressure loss per mile in transporting 508 bbls. per hour through a mile of six-inch line. The gravity of the oil is to be taken at 35 degrees A. P. I. and the viscosity 100 Saybolt seconds Universal.

The first step is to determine the value of the ratio dvs/u.

In the formula below, the velocity is expressed in terms of barrels per hour and the diameter in feet is converted to diameter in inches.

$$\text{dvs/u} = \frac{0.02381\ B\ s}{D\ u} \qquad (24)$$

The value of s/u is the reciprocal of the kinematic viscosity which is determined from Figure No. 4 or formula No. 21.

In this case s/u = 4608

$$\text{Then dvs/u} = \frac{0.02381 \times 508 \times 4608}{6.065}$$

= 9190 approximately.

The value shows that the flow would be turbulent.

From formula No. 18, the specific gravity of a 35 A. P. I. crude equals

$$\frac{141.5}{131.5 \text{ plus } 35} \text{ or } 0.85$$

Then the density of the 35 A. P. I. crude is equal to 62.4 x 0.85 or 53 pounds per cubic foot.

Then from Figure No. 11, curve cd' the value of "f" corresponding to the ratio dvs/u at 9190 is 0.0355.

From formula No. 15

$$P = \frac{0.55830\ f\ B^2 s}{D^5}$$

$$= \frac{0.55830 \times 0.0355 \times 258064 \times 53}{8206}$$

= 33 lbs. per. sq. in. approx.

In a like manner the friction loss for the flow of water, gasoline or steam could be determined.

Conclusions

With certain limitations, the method of determining the friction loss in this paper is applicable to the flow of homogeneous viscous liquids; however, it is not applicable to plastic or semi-plastic materials. For heated liquids the viscosity change due to the loss of temperature along the line must be considered. The method does not hold for short tubes, probably less than 1,000 diameters in length, because in a short length the entrance and discharge losses are a material factor in the total loss. The method holds for gases also, where there is no great difference in the initial and final pressure; it does not hold where there is a large pressure drop unless a correction is made for the change in density, temperature and rate of flow of the gases with the change of pressure.

The theory developed by laboratory experiments on the flow of liquids has been confirmed by actual pipeline practice.

It appears that the relation of the coefficient of friction to the ratio dvs/u will fall near the Stanton and Pannell curve for sizes of new steel pipe larger than eight inches, and that for the smaller sizes of pipe, a family of curves corresponding to the Stanton and Pannell curve will exist higher on the scale. The Lander and the Kite and Kennedy curves should be typical for the smaller sizes of pipe. It is believed that as the pipe increases in diameter, the roughness of new commercial steel pipe becomes a decreasing factor in the friction loss to a point where it is negligible.

Some further work should be carried out to determine the nature of the flow along the walls of commercial pipelines; perhaps laboratory experiments should precede the work. In oil pipelines there is a tendency for the walls of the pipe to become coated with a layer of paraffin or asphalt, which reduces the diameter of the pipe and consequently its capacity. Such an investigation might throw some light on the causes of the paraffin collecting along the walls of the pipe; it would also give designers of pipelines more information on the mechanism of flow in commercial pipelines. The work of Stanton, Marshall and Bryant on the flow of air near the walls of a pipe suggests further investigation along this line. In fact, it is believed that it would be worth while to explore the whole of the fluid cross-section of operating pipelines.

It is believed that some further research work should be carried out to determine whether one coefficient of friction curve in the turbulent region will satisfy all sizes of commercial steel pipe or whether the effect of the roughness factor is variable with the diameter of the pipe and a family of curves is necessary.

The work of Bridgman on the viscosity of liquids should be extended to include crude oils at pipeline operating pressures. Further information on the viscosity of crude oils under pressure will be helpful in the design of pipeline systems.

It is believed that some further research work should be done to determine any variation in the relation of "f" to the ratio dvs/u on either side of the critical regime when large and small sizes of pipe are used.

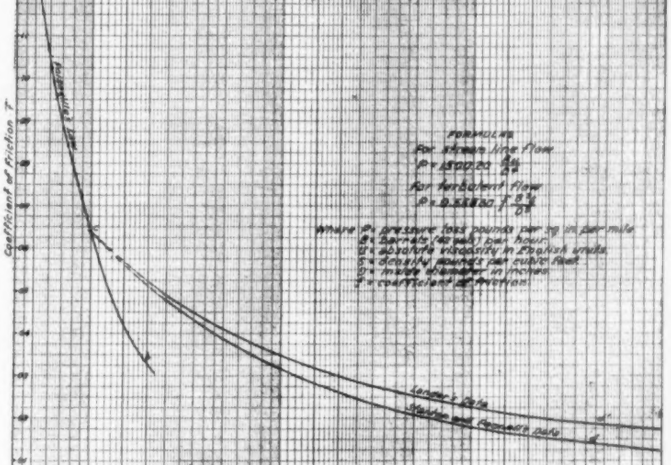

Fig. 11.—Recommended curves for the coefficient of friction.

Nomenclature

B—Barrels (42 gallons) per hour.
d—inside diameter in feet.
D—Inside diameter in inches.
f—Coefficient of friction.
g—gravitational acceleration, 32.2 ft./sec./sec.
h—pressure head in feet of liquid or fluid.
l—length in feet.
P—Pressure pounds per square inch.
P_1—Pressure pounds per square foot.
Q—Volume in cubic feet per second.
r—Radius in feet.
s—Density in pounds per cubic feet.
t—Time in seconds, represented in the various calibration formulas for viscosimeters.
u—Absolute viscosity in foot-pound-second units.
v—Velocity in feet per second.
ϕ—Indicates some function of the ratio dvs/u.

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TELEGRAPH SYSTEM IMPORTANT FACTOR

(Continued from Page C-138)

break has been repaired, the wires are used to rearrange the disordered system, and once more to regulate the normal travel of oil through the lines. When regular travel rate has been resumed, the wires drop back to their ordinary work of keeping the dispatchers familiar with the receipts, strokes per minute, and pressures used in pumping, and these are checked hourly, the receipts against the deliveries.

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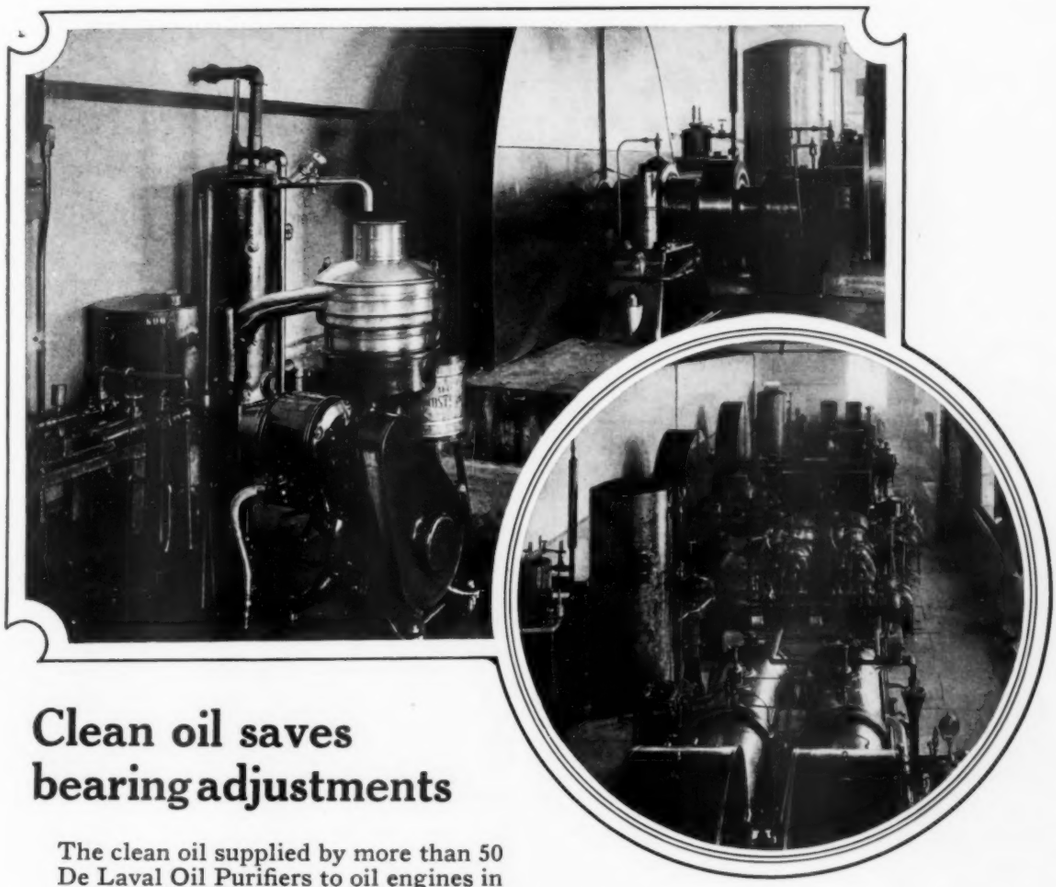

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Mr. Wagner is the pioneer in the pipeline industry in the matter of welding oil pipelines. He is recognized throughout the world as one of the best posted men on the subject and one of his articles on welding oil pipelines won the gold medal in a national competition. The Prairie Pipe Line Co. is, as far as known, the first pipeline company to weld its lines and it welds every line it lays at this time. The line from Mexia to Hensley, Tex., 140 miles long, described by Mr. Wagner in this article, was the first long welded oil pipeline in the United States.

In the fall of 1918, I convinced the officials of our company that we should have a cutting and welding outfit for use in our boiler repairing, which was the work then directly under my supervision. We obtained the outfit and showed such a remarkable saving in cutting out crown sheets, side sheets, stay bolts, etc., that we began to look for other fields in which to use not only the cutting torch, but the welding torch. In our boiler repair work we were able to cut out bolts in badly buckled crown sheets and side sheets, straighten out the sheets, build up the enlarged holes with a welding blowpipe, and replace new bolts, putting the boiler back in almost as good condition as when it was new, without using any new material whatever except stay bolts. Our saving in the item of labor alone in this class of work was an eye-opener to all concerned.

After reclaiming a large amount of secondhand short pieces of pipe by cutting the threads off and welding the pieces into 18-foot to 25-foot lengths (which could be used to just as good advantage as new pipe in drain or gravity lines) at a saving of many hundreds of dollars, we began to experiment with the pipelines by welding broken screwed coupling lines at various points in the field. After a long series of experiments, I obtained the permission of our officials to weld a 15-mile, 8-inch oil-carrying line from Bartlesville, Okla. to our Cherokee Station, near Ramona, Okla. We started this work in December, 1920, and although it took longer than we had figured, owing to very inclement weather and the rough contour of the country, we finished this work in reasonable time and at a cost which our engineers figured was only about 5 per cent more than what it would have been if the screwed coupling line had been laid.

Two men welding joints of pipe

First Welded Line

In this work, we had many problems to solve which have been of value to us since then, and we were somewhat handicapped by the fact that the pipe was furnished us in lengths of 17 feet to 24 feet (beveled at each end at the mill), instead of 40-foot lengths which we had ordered. This meant that we made about 4,200 welds. Upon testing the pipe under 700-pound cold water pressure, but two small leaks developed owing to defective welds. The pressure was reduced about 100 pounds and the line was cut at these two places with an oxy-acetylene cutting blowpipe to drain off the water. New welds were made, the line was filled with water, and the pressure was raised to 800 pounds, and held for approximately 48 hours. As no leaks developed a scraper was started through the pipe. To the surprise of the officials of the company, it passed through the line without stop in about an hour less time than had ever been required to pass a scraper through any of the screwed coupling lines which parallel this welded one.

A serious question had confronted us and my officials were particularly anxious about it. It was feared there would be a lot of drips or icicles of metal running through on the inside of the pipe and that these would damage the scraper, probably stop it, and cause a lot of trouble. However, the record of the passing of this scraper shows that we had all our anxieties for nothing, and as the line proved to be efficient in every way it was immediately put into service. It has carried oil pressures of 650 pounds to 750 pounds and over, almost continuously since.

Some of the Difficulties

I will give you some idea of the difficulties we had to overcome: There was one creek we had to cross four times within one-quarter of a mile. At the crossings we simply welded several lengths of pipe together, dragged them into the trench, and bell-hole welded them into the line, allowing several joints of pipe to extend out over the creek bed and remain 24 hours or so, when a "fire bend" was applied to make them conform to the creek bed. Furthermore, on several occasions the weather was so cold and the wind so strong that it was necessary to use extra large heads to concentrate sufficient heat on the metal to make a weld; and at times we had to set up windbreaks to protect the welder and the flame from the fierce blasts.

To overcome the possibility of the line breaking, due to contraction, we were particular even in this cold weather, when putting the pipe in the trench, to give it plenty of slack.

In July and August, 1921, we laid another 8-inch line about 14 miles in length. This is what we term our "Shawnee Loop." It reaches from Meeker to Davenport, Okla. This country is also quite broken, but we were fortunate in having 40-foot lengths of 8-inch pipe, and the work proceeded much more rapidly on that account. However, it was necessary, owing to the intense heat at that season, to supply each welder with a large umbrella of the kind used on wagons, to protect him from the sun. It was never necessary to build a fire to make the bend in the pipe, as the metal absorbed so much heat that the bends were readily made by simply having a few men hang on the end of the pipe.

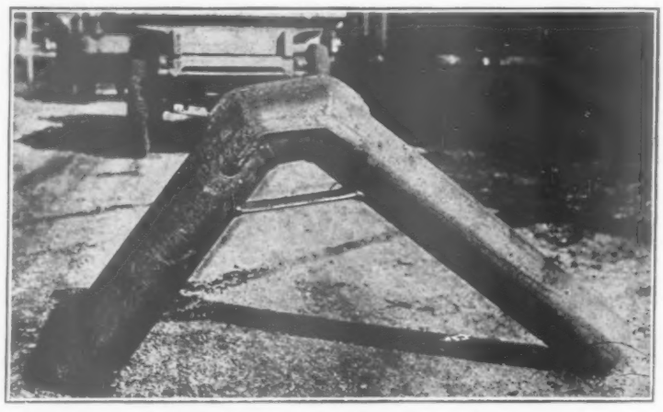
We had to cross several ravines and creeks, and in one or two instances where we hitched a couple of teams to a 400-foot welded section and dragged it across the ravine, leaving it suspended between the banks for 24 hours before bending it to conform to the terrain.

Immediately in Service

Upon testing this line under 800-pound cold water pressure, not a single leak developed in the welds. We passed the scraper through it with a pressure of about 750 pounds of oil back of it and the line was immediately in service.

Of course, in laying this line in the trench, the work was done early in the morning when there was the most contraction in the metal, but it was necessary to put in a greater amount of slack owing to the fact that the metal was not contracted as much as the line we laid in the cold weather. We were, however, successful in our calculations and have never had a moments' trouble or expense for maintenance of this line.

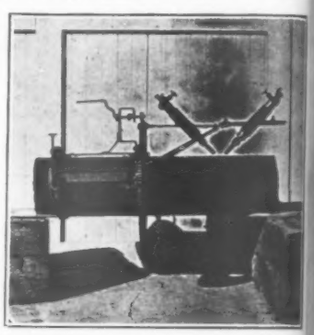
As these two experimental lines and the work we had done in repairing lines in other sections had proven satisfactory, it was decided by officials of my company to weld an 8-inch oil-carrying line from Mexia to Hensley, Texas. This is a distance of approximately 140 miles and for this work it was necessary to increase our equipment materially. We placed an order for eight 100-pound ca bide capacity portable acetylene gener tors, 46 welding stations (including 1 000 feet of hose), four cutting blowpip and 20,000 pounds of ⅛-inch Norwa iron, copper coated.



Heavily reinforced ell made by welding

Method of Working

In laying this line we divided ou equipment into four sections, each for man heading a crew of 11 welders, generator men and a couple of helpe Two crews started from Cleburne, i opposite directions, a third crew fro Mexia, and the fourth from Hensley, i order to cover the distance with the les possible delay and still do efficient work We loaded each generator on a broa tired wagon and secured it by means a hoop around the body of the generat and braces bolted to the wagon bed. O each wagon also, we built an oxyge cylinder rack and extended the pipin for acetylene from the generator to th



Machine designed by Mr. Wagner for cutting pipe. The handle is connected with small gear which turns big gear, revolving the pipe as torches cut a bevel edge.

wagon end where we installed the ga regulators. Ordinarily four welder worked from each generator, welding fiv 40-foot lengths of pipe at a setting. Th two inside welders used 50-foot length of hose, while those on the ends used 75-foot lengths. At each setting of th two generators under one foreman, tw 200-foot sections of 8-inch pipe wa welded. The generators and their crew were then moved up, leaving behind th welders assigned to the tying in of th welded stretches on the surface and a "bell-hole" man to make the welded joint in the trench. In some instances the pip was rolled into the trench so the tie-in could be made in the bell-hole; in others where the contour of the country wa favorable, the surface tie-ins were made on skids over the trench and the pipe end in the trench were lifted with a windlass and blocked up so the trench tie-in could be made without digging bellholes. In welding oil-carrying lines we have made a practice of lining up the pipe on blocks with ends closely butted before the generators are set. Thus the welder can start to work at once. They first make a couple of tacks to hold the pipe in position, after which they weld half way around. The pipe is then rolled over and the welders finish the joint.

Constructs Water Wagon

To supply each pair of 100-pound generators with water, we constructed a wagon tank of about 250-gallon capacity. The tank is equipped with a pump and carries ample water to flush out the sludge and to re-fill the water chamber in the generator before a new charge of

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carbide is put in. In this way we have secured a proper water supply without which there would be serious loss of time.

We have carefully estimated the work on this line and feel sure that had we been favored with even fairly good weather we could easily have had oil pumping through the full 140 miles of line within 60 days from the time we started; but we were held up by storms which sometimes made it impossible to even get to the line, much less do any work.

In laying this line we did not have to consider river crossings but we had a large number of railroad crossings which required special attention. In Texas, as in many other states where an oil-carrying line crosses under a railroad, it is necessary to encase the oil-carrying line in a larger pipe so the oil will run out without damaging the embankment in case of leakage. At all such crossings we welded the ends of the larger pipe to the oil-carrying line, leaving adequate drainage vents in the joints.

We built four pumping stations on this 140-mile line.

Oil Moves More Rapidly

I have been asked a number of times if oil passes through a welded line more rapidly than through screwed coupling lines. It is the opinion of myself and my officials that such is the case. We have never been able to make an actual test because when the oil leaves the pumping station through the discharge line it flows into a manifold leading to the several distributing lines. However, inasmuch as the welded pipe ends were butted together and leave no gaps, there is no opportunity for a back-wash of the oil to retard its flow and it seems obvious that it must pass through with greater speed than in the screwed or other coupling line.

I have also been asked occasionally what I consider most essential to success in welding oil-carrying pipelines. My answer has always been: First, secure good equipment—it will cost a little more but in the end the saving in gas and in better welds will more than make up the difference. The next item is the welding rod. No matter how good the equipment and the operator, if the welding rod is not the best, there is almost sure to be grief aplenty. The third item is the personal element. A poor welder will do poor work, no matter how good his equipment or welding rod. There is no place for him on a pipeline job.

We made approximately 18,500 welds on this 140-mile line, and on testing it under 800-pound, cold-water pressure, it was found that there were but four defective welds. This fact speaks volumes for the equipment, for the welding rod used, and particularly for the efficient work of the welders.

Welding an oil pipeline

Efficiency of the Line

Let me give you an idea of the efficiency of this line. After putting it into operation the country suffered severe storms which flooded various districts. In a number of places our welded line was washed down hill or undermined, resulting in severe strains on it until it could be pulled back into place or reditched; but despite this severe test the line still holds together just as we left it after the cold-water test. This, I am positive, will convince the man with pipeline experience, that the welded line is far superior to the screwed coupling line, for should such strains occur on a screwed coupling line, it would surely break out at many of the couplings.

Our engineering department figures indicate that by welding this line a saving of nearly 35 per cent was effected. This saving and the fact that there will be practically no repair or maintenance costs and no loss of oil or damage to land due to oil leakage have convinced us that oxy-acetylene welding is the most efficient method of laying oil-carrying lines. We have, therefore, been adding welded lines to our loop lines in various sections.

After carefully checking up our records, we have arrived at a figure of $2 as the cost per weld on this 140-mile line. This includes carbide, oxygen, Prest-O-Lite acetylene for tying in the bellhole welding, the welding rod and the labor cost of foreman, welders, helpers and generator men.

For protecting the pipe from the action of alkali and other soil impurities, we give it a coating of Parolite, which is heated like pitch and poured over the pipe after welding. This liquid is caught under the pipe in a sheet of canvas which is drawn back and forth to assure the liquid adhering to the bottom, sides and top of the pipe. All parts thus become thoroughly coated. This coat sets readily and is the best protection we have thus far discovered.

Welding River Crossings

We have also welded a number of river crossings where we had suffered considerable loss and inconvenience due to the breaking of couplings. For river crossings we use much heavier pipe than for ordinary line work. It runs about 43 38/100 pounds per foot. In many instances pipe laid upon the beds of the stream, even when secured with heavy clamps, will be undermined by the action of water on sand and left suspended. As a result the constant vibration of the water against the pipe will wear out the threads of any coupling, whereas the welded line withstands this water action. Thus far we have had no difficulty with our welded river crossings and do not anticipate any.

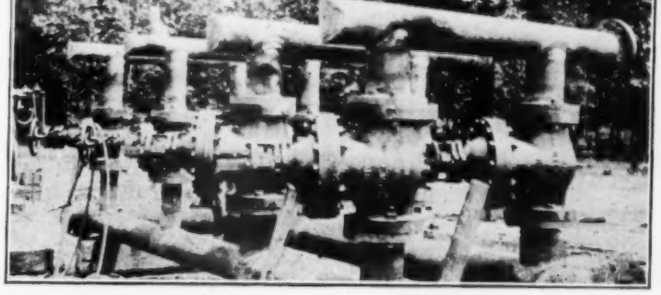
We have also successfully laid several 4-inch and 6-inch lines. This work is carried on as previously described. In addition, we have reclaimed a good deal of screwed coupling line in alkali districts where the alkali had eaten into and pitted the pipe. The procedure is to run a scraper through the line with water pressure back of it to clean out the oil, paraffin and gas. We then uncover the pipe and raise the pitted sections with a windlass. Next the couplings are removed and the pipe is rolled out and thoroughly scraped to ascertain the depth of the pitted places. The holes are then welded, and the pipe is carefully painted with Parolite and placed back in the line with the screwed couplings, unless the threads are in such shape that they will not hold, in which event we cut off the threaded ends and weld in that particular joint.

This method saves the labor of hauling the pipe to the yards, cleaning it, welding it and then transporting it to some other point. It also saves investing in new pipe and enables us to put the line back into service with the least possible delay. We have probably reclaimed 70 or 80 miles of 8-inch line in this way.

Other Welding Works

Aside from pipeline welding and reclaiming pitted pipe in the field, we keep our welders busy around the stations and shops building stairs for 35,000-bbl. and 55,000-bbl. tanks, those of the smaller sizes using discarded 2-inch pipe and plates which would otherwise go into the scrap pile.

One of our very large salvage showings with the oxy-acetylene outfit has been in the repair of storage tanks. As an instance I might mention a 3,000-bbl. tank which had been in use for over 10 years and which was in good condition except that the bottom was eaten out in places through salt water action, several holes were eaten through the sheets, and a great many rivets were eaten off, thus loosening the seams. Previously on jobs of this kind it was necessary to remove the roof and timbers from the tank and cut down the shell, lay a new bottom, rebuild the shell and place the roof, which meant large expense for such repairs. We were able to make these repairs with oxy-acetylene equipment at a great saving. We removed the roof and timbers, cleaned out the tank bottom thoroughly and then welded up the seams and holes, the job taking two men about six days. The timbers and roof were replaced and the tank put back in service practically as good as new. We were able to save all of the iron, which would have been junked and replaced with new metal if the former method of repairing had been necessary. We have repaired two 3,000 bbl. and several 35,000-bbl. tanks in the same manner with excellent results.



Example of welding manifolds

Welding Manifolds

In addition to our regular pipeline welding, we apply the oxy-acetylene process to our station work, such as welding discharge lines from pumps to manifold house, welding ells and connections on discharge pumps working under pressure from 650 to 750 pounds 365 days a year and 24 hours a day. The only times these pumps are shut down are to make repairs to engine or pump. You will understand that the manifold house for oil pipelines is the building in which all gate valves are placed on large manifold connections so that the stream of oil can be changed from one line to another. Suppose for instance, that we are pumping through six 8-inch lines from one of our trunk line stations and the line walker discovers leaks on one line. He immediately advises the station foreman or chief engineer, who will make proper changes on the manifold gates to cut out the line reported leaking and continue pumping through five lines until the other line is repaired, after which the manifold gates will be changed back again to pump through six lines.

The more lines leading from a station, the lower the pressure and, vice versa, the fewer the lines the greater the pressure. It is an acknowledged fact that the greatest strain on oil lines is nearest the station or between the pumps and the manifold. Not only is pressure the highest here, but there is also considerable vibration.

With screwed connections it is almost impossible to keep couplings and connections from leaking, and station grounds are spotted with oil. After having much success with welded lines and welded manifolds, our general superintendent decided the best way to eliminate breaks and leaks in station yards between pump room and manifold house was to weld everything complete from pump head to manifold gate valve. We completed one of our trunk line stations in this way, making two section welded ells for 90 degree angle and welding forged steel flanges at pump connection, also at gate valve connection and manifold connection, these forged flanges being made especially for welding to pipe. After completing most of this work we are satisfied this is the proper way in which to equip all our trunk line stations, and later all our gathering stations, to eliminate leaks and breaks in station yards, which frequently occur with screwed couplings and screwed fittings.

Better and Cheaper

While we are still on the subject of manifolds I will endeavor to explain to you some changes we have made from cast-iron to pipe-welded manifolds. We have been delayed on work at our stations at times on account of waiting for cast-iron manifolds. The delay and the expense of shipping such heavy castings, to say nothing of the chance of their not fitting after being landed on the job, were too serious to overlook. So with the general superintendent's approval, we decided to make up welded manifolds. By using extra heavy pipe and forged steel flanges, we were able to turn out a much cheaper and a better manifold than any cast-iron manifolds we could buy.

These welded manifolds are subjected to heavy strains, as all oil lines leading from the station are connected to the manifold, and it is well known that all lines do not expand and contract equally. Also there is much vibration on manifolds, as they are erected close to pump room building, where the pressure is highest. We have had very good success with welded manifolds, having found no defects in any we have built to date. We have made great improvements in connection work around our pump stations by using the oxy-acetylene process which has enabled us to eliminate many fittings, both light and heavy. We are able to make neater connections and make them at much lower cost. On many station lines we eliminate the fittings by cutting holes into the lines at points where connections are desired and welding in branch lines which are run to the desired points in pump or engine room.

Again, we use the oxy-acetylene process to good advantage in welding air lines in engine rooms. Air is pumped to storage tanks and is used for starting

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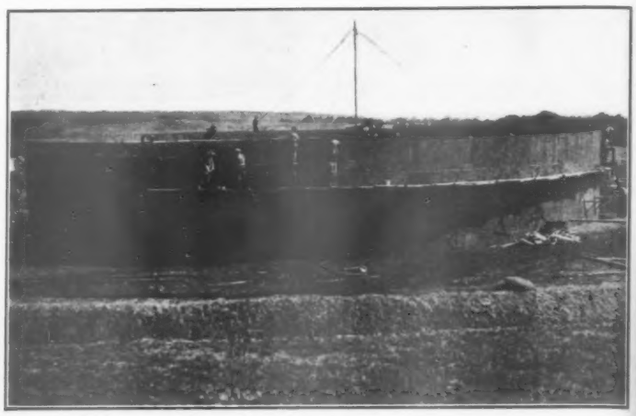

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engines. By welding we are able to make a neater job on these lines, besides eliminating leaks, which are frequently on air lines installed with screwed couplings and fittings.

Another item of importance in the pump and engine room, on which we show a great saving besides making a much neater job, is guard railing over pumps, around fly wheels, etc. Previous to welding these guards we purchased special screwed fittings for guard railing but welding makes a neater and stronger job, does away with the fittings entirely, and ordinary pipe of the required size is used.

We also install heating systems in our

Reinforcing a welded joint for river crossings

stations at moderate cost compared with that of heating plants which are purchased for this purpose.

This is a special job because it is necessary to place dividing walls between engines and oil pumps on account of the fire danger, for if any part of the pump or line should break and cause oil to spray over the engine, it would probably become ignited. This precaution is necessary only where gas or oil engines are used. On the engine side of the stations we install what we term exhaust radiators. These are made up by using old 6-inch or 8-inch pipe for headers, and ordinary second-hand boiler tubes welded to the header from the exhaust line to another header 15 to 25 feet distant, where exhaust gases pass to an open stack at side of the building. By passing exhaust gases through these tubes we are able to make enough heat for the engine side.

Exhaust Pipes

For the pump side of the station we place a piece of pipe of desired length and size over the exhaust pipe, making welds at each end by V-ing the jacket pipe and turning it in all around to fit the exhaust, or using rings cut from straight steel plates, the inside diameter to fit the exhaust and outside diameter to fit the jacket pipe. When the welds are completed at both ends we weld in the desired connections and turn overflow-water from the engines into the exhaust water heater. The exhaust gases passing through the exhaust pipe, heat up the water contained in the jacket, and this water is piped to hot water radiators on the pump side.

Another saving we make by means of the oxy-acetylene process is in building stairs for our work tanks at stations. This we do by making side railings and frames from old second-hand pipe, using for steps second-hand tank iron. All material used in making these stairs is taken from the scrap pile. By welding the stairs to proper lengths and sizes, we are able to install them at a very low cost compared with the cost of steel stairs bought from the iron companies, and we find that they give very good satisfaction.

Scrap pipe is something in which I am deeply interested, for when we reclaim material from the scrap pile by using the oxy-acetylene process, we make things that are useful for our stations and are able to make our greatest showing and saving. Among the things we make from scrap materoial are lubricating oil tanks of different sizes ranging from 2½-bbl. to 10-bbl. or 12-bbl. capacity. The material used is second-hand, 10-gauge, smoke-box iron, scrapped from our old steam plants which we dismantled after oil engines were installed. By cutting this iron into desired sizes and passing the pieces through rolls to give them the proper curve, we are able to weld up and complete the tanks at a very low cost. These tanks give the same service as new tanks bought ready-built.

Other things we make from material that is scrapped are towers of all kinds and sizes. These towers are to support water tanks, fuel oil tanks, etc., and are made of second-hand or scrapped pipe of different sizes. This is pipe that has been thrown out of actual line service on account of being badly pitted or eaten in spots, which condemns it for further use in pumping oil; but by applying our cutting and welding blowpipes we are able to turn out very strong and nice appearing towers for use around our stations.

Make Portable Buildings

From this same pipe we are now making frames for pump station buildings and for smaller buildings such as manifold houses, tool houses, garages, etc. We have figured out a design to make these buildings portable, and if we desire to move them they can be taken down by simply removing a few bolts—taken down in sections and replaced on new locations by replacing sections in proper place and bolting them together again. These pipe frames are covered with corrugated iron and make a very substantial and neat-appearing building.

Preventing "Icicles"

One of the first questions we are asked regarding welded oil lines is: "How do you keep from dropping metal on the inside of the pipe, causing icicles or drippings?" Of course it is much easier to show on actual work how a weld is made without dropping metal through, but I may say that if the welder holds the blowpipe at the proper angle and handles his rod right it is almost impossible to drop metal through. If metal does drop through, it is the fault of the welder, who may be either incompetent or a deliberate offender.

Another question which is frequently asked is: "How do you make repair splits or breaks in weld after oil has passed through line?" We have not had any welds to break after oil has passed through lines. A split or break of any kind would have to be repaired in the regular way. To repair a small split in a pipe we use a saddle clamp and draw it down with "U" bolts, placing a gasket of good material under the saddle. If a split or break is too large for this method we take out the defective pipe, make a new piece to fit and then, after all the oil is drained off and before proceeding to weld the new piece into place, we carefully mud both ends of the line so that no oil or gas can pass through to the opening during welding. We have thought of experimenting with air bags made of heavy air-tight cloth or rubber, instead of using mud on repairs of this kind. The bags could be pumped up with an ordinary tire pump at the desired place in the line, and the tube could be unscrewed, leaving the bag to hold back drainage. After the welds were completed, the oil could be started again. As soon as pressure built up, the air bags burst and travel down line with the oil flow. In some instances the air bag might be better than the mud.

We are asked many times how we expect to take up the welded lines so they can be relaid again with least expense. We have a cutting device which cuts the pipe, leaving it beveled on both ends at the proper angle to weld again. We expect to operate about four of these cutters from one truck or wagon on which will run four wires to the cutting machines. Thus we will be able to make four cuts at one setting. In this way we can take up from one to two miles of 8-inch pipe a day with a small crew, and as stated before, the pipe will be in shape to relay without the expense of preparing the ends for welding.

Reinforced Ells

I wish to call attention to a two-section 90 degree Ell which we developed. We have had some of these special Ells in service on discharge lines where vibration and pressure are greatest without a single failure up to the present time. In making up this Ell we make a double "V" cut in pipe, leaving from 3 to 4 inches of pipe stock on the back side of the Ell and a center section of any desired length. We then heat the pipe where 3 to 4 inches of stock remains and bend the ends up to close the "V" cuts which then forms a 90 degree angle. We then weld at the two points where the "V" cuts join together after bending. When these welds are completed, we take a piece of one-half by 1-inch flat iron and place it edgeways or with the narrow side to the pipe on the back side of Ell so that both ends extend over the "V" cut about 3 inches. We then weld this strip to the Ell on both sides which makes a reinforced fin on the back of Ell. We also apply one of these strips to each side of the Ell in the same manner. Then we proceed to weld brace of one-half by 2-inch iron or a piece of split pipe from one run of the Ell to the other. This we call our reinforced Ell for high pressure service. I believe this special reinforced Ell is of great value to any one on high pressure work or where there is much vibration. (Prints and photos).

Oil pipeline welding outfit

Our reason for developing this special Ell is due to the fact that we had a couple of failures on common welded, two-section Ells on our discharge lines at pump headers where pressure and vibration are greatest.

We have also welded several liners for railroad crossings. On these jobs where new railroad beds were being built on account of double tracking, it was necessary to lengthen the liner through which the main oil line runs. We figured that in these cases it would be expensive to shut down stations to cut the line in order to slip liner on pipe. Furthermore, it would have been impossible to drain line at these points from stations, which would have meant that if we did cut the line that there would have been a loss of oil and not only that, but would endanger the lives of many people on trains passing these points where oil had been spilled over the right of way. We then decided to split the liner pipe in halves and place it over oil line and reweld back together. This we did without any trouble or loss of oil. Also without the necessity of shutting down the stations.

For River Crossings

It has always been customery in laying pipelines across rivers to place heavy cast iron clamps at each joint to protect the coupling if screw pipe was used. We now use plain end pipe and put on good reinforced welds with four pieces of ½ by 1 by 7 inch flat iron strips over circular weld, spacing same at quarter points on pipe so that each strip will extend 3 inches on each joint from the circular weld, thus adding additional reinforcement to the weld in order to withstand any extraordinary strain which might be brought to bear upon pipe during flood stage of river. These reinforced strips are applied in the same manner as on our reinforced Ells. After the three or four joint sections, necessary to cross the channel, are welded, we pull these sections across, making our tie-up welds in the same manner and lower line in the river without clamps of any kind.

Cast Steel Fittings and Pump Connections Feature Ozark's Line

During the year 1916, the Roxana Petroleum Corp. decided to construct its own pipeline system for moving oil from the Healdton Field in southern Oklahoma to its refinery at East St. Louis, Mo.

A subsidiary company was formed and called the Yarhola Pipe Line Co. and the line was built in 1917. Starting at Healdton, it went north to Cushing, and thence northeast to East St. Louis, a distance of 550 miles.

The features of this line are that it is the only pipeline system equipped throughout with cast steel main line fittings and pump connections, and that it is a solid 10-inch line for its entire length.

The name of the company was changed about three years ago to the Ozark Pipe Line Co. and it has since operated under that name. It handles on an average of 60,000 bbls. daily, a large percentage of which is produced by the Roxana Petroleum Corp. and the Comar Oil Co. which is partly owned by Roxana.

The principal fields which are served by the Ozark line are, Garber, Braman and Healdton. The Roxana has very good production in Garber and Healdton, and the Comar at Braman.

The Braman Field is close to the line which divides Oklahoma and Kansas, and from this field the Ozark lines were built into the Rainbow Bend Pool in Township 33-3 Cowley County, Kansas. This is the only Kansas field tapped by the Ozark line, but at present lines are being built from Rainbow Bend to the recently discovered production in Township 31-2, Sumner County, Kansas.

In order to serve the Roxana Petroleum Corp.'s refinery now under construction at Chicago, pipeline facilities are being built from the East St. Louis refinery to Chicago. This line will be an 8-inch welded line and will cover a distance of 255 miles. An unusual feature of the new line is that the pipe desired was 40-foot plain end pipe, and the order was placed with a mill which did not manufacture this size pipe. By agreement two joints of pipe were welded at the mill, and when shipped the welded lengths were 40 feet.

There will be eight stations on the new line.

PRAIRIE AIDED GROWTH OF MID-CONTINENT

(Continued from Page C-77)

dorado Fields were located. The phenomenal production of wells in these two fields caused a rush to provide pipeline accommodations for the oil, and the Prairie constructed a line from Neodesha straight west to the new fields in Butler County.

Shortly after the first wells were drilled in the Ranger Field, in north Texas, work on the first Prairie line which ever crossed the Red River into Texas was started. The construction began in March 1918, and 272 miles of trunk line were laid from Drumright, Okla., to Tiffin, Tex., a town near Ranger. This marked another chapter in the Prairie history, and gave it its entry into the Lone Star State.

The year 1919 formed a very tranquil period in the Prairie history, and practically no extensions were made. In 1920, the Deaner Pool in Okfuskee County, County, Oklahoma, was opened, and once more an advancement of lines became necessary. This same year, the Hewitt and Duncan Pools in Carter and Stephens Counties were opened up, and as they were fairly close to the Prairie's line to Texas, they furnished additional revenue in pipeline tariffs.

Another important step taken by the Prairie in 1920, was its entry into the Wichita Falls district of north Texas. The Prairie Oil & Gas Co. had purchased the properties of the Ryan Petroleum Co. in the winter of 1919, but formal control and operation of the lines was not turned over to the Prairie Pipe Line Co. until the spring of 1920. This acquisition gave additional territory to the Prairie, and again their daily runs were increased substantially.

Burbank Field in 1921

The Burbank Field in northern Osage County appeared upon the scene in 1921, and the Prairie was one of the first lines to take the oil. An extension of the Osage lines to the west was necessary to reach this great field. In the southern end of the state, the discovery of the Lyons-Quinn Pool west of Okmulgee in Okmulgee County caused an extension of the Prairie lines from the Deaner Pool.

In 1922, two important steps were taken by the Prairie, first the building of a line into the Mexia district of Texas, and second, the entry into the Tonkawa Field in Kay County, northern Oklahoma. The building of the Mexia line formed the third step in the broadening of Prairie operations in Texas. The line was built from the Mexia field north to the Hensley station on the main line from Ranger to Oklahoma. As fields developed along this line additional extensions were made.

The Smith pool near Wewoka, in Seminole County, Oklahoma, was about the only operation which caused the building of any additional Prairie lines during 1923. Discovered in the spring of the year, this field was destined to perform a comeback three years later when deeper drilling uncovered the Wilcox sand, and doubly rewarded the pipelines which had served since its discovery.

A fairly busy year was experienced in 1924 when the Cromwell Pool in Seminole and Okfuskee Counties, and the series of pools in Greenwood County, Kansas, were thrown open. The drilling of the Cromwell Pool caused an extension of the Prairie lines from Wewoka, and the Greenwood County Pools were situated on the main line from Butler County to Neodesha, and required an extension of approximately 10 miles.

Opening to the Gulf

One of the most important occurrences in the history of the Prairie took place in 1925, when the controlling interest in the Pure Pipe Line Co. of Texas, was purchased. This move gave the Prairie lines an outlet from Mexia, Tex., clear to the Gulf Coast, and opened once more, new channels and connections for eastern shipments. In the opinion of many students of pipeline matters, it was a very shrewd move, and one which placed the Prairie in an enviable position. By acquiring this line, the Prairie may take Oklahoma oil, and by routing it to the Gulf Coast ship it to the eastern refining centers. It places within its trade reach several large refiners who are purchasers of the better grades of Mid-Continent crude, and it should prove a valuable adjunct to the network of Prairie lines.

Line to the Panhandle

The most important development in pipeline operations during this year is the beginning of construction by the Prairie of an 8-inch pipeline to the Texas Panhandle. This line, 208 miles long, will extend from Kings Mill, in Gray County, Texas, to connect with the existing trunk lines of the Prairie at Addington and Ringling, Okla. It is the first pipeline from the Panhandle Field to outside markets and is undoubtedly the most important pipeline development of the year.

Early this year the line built into the Seminole Pool in Seminole County, Oklahoma, was extended. This field may be one of the largest producers of the state, as it has performed steadily to date.

In conclusion, a tribute to the policy and personnel of the entire Prairie organization was paid recently by a visitor to the main offices. The man in question has been interested in oil in a small way for many years, and discussing the splendid treatment accorded him by executives of the Prairie he used the good old oil field vernacular and said: "Gee, that bunch certainly are all regular guys." There may have been a time when secrecy marked the operations of the Prairie, and the closed door was their policy, but as the bank cashier said when he shoved a sack of dimes through the window, "That's been changed."

MEASURING TANKS TO LEARN CAPACITY

(Continued from Page C-82)

If he cannot get these weights and measurements accurately he reports the tank manufacturer's name and address and whether the deadwood is wooden or steel and the engineer obtains the missing data from the builder.

"Prostrates" Hard to Measure

Many horizontal tanks have come into the industry since the advent of the natural gasoline business. These tanks are sometimes called "prostrates." They are characterized as "mean cusses" to measure. The strapper is instructed to take the lengths of the shell on each side from end to end of sheets. He finds the perpendicular height of the bulge (if any) from the end of the sheets. This is not included in the length of the shell. He finds the arc measurement of the bulge; this is from the end of the sheet on one side over the bulge at the highest point to the end of the shell on the other side. He reports the thickness of the iron of the shell and the thickness of the iron of the bulge. If there is no bulge he reports "flat ends." If the ends are cone shaped he reports it, giving the height as for bulge. He reports the location and quantity of deadwood as in any tank. He takes the circumference on the center of each ring and reports it separately, with total.

Outage tanks and wax pans in oil refineries are among the other containers which the tank gauging engineer is called upon to measure. They present no more difficulties to him than the crude oil and refined oil tanks of the usual shape. A new spherical tank which has lately appeared in the oil industry is the latest to test his ingenuity. But one engineer who saw such a tank in Creek County, Oklahoma, said it could be measured accurately, but it might be troublesome until the engineer got the hang of it.

The rules under which tank strappers work may vary somewhat, but the above manner of procedure in obtaining the data upon which the tank gauging engineer must depend to figure correctly just what a particular tank contains at each quarter inch or at each inch, as the case may be, may be taken as standard.

Not As Hard As It Sounds

Tank strapping is a special line of work for which men are trained. It is not nearly as difficult to correctly strap a tank—any kind of a tank—as one might think by reading the above outline of a strapper's work. The engineers worked out the system, the pipeline companies adopted it and the strappers are expected to conform to it. The main thing about good tank strapping is fidelity. The strapper is expected to do his work with all care and diligence and if the owner of the tank wishes to be there when the strapping is being done and to check the figures as the work proceeds it is his privilege, although as a matter of fact most tank strapping is accepted by the producer on faith. He has confidence in the company that is running his oil and the company in turn has faith in the man who measured the tank. The engineer, with a sixth sense developed by years of experience can at once sense any serious error in a strapper's figures and he is quick to ask for a check on any item that appears incorrect and usually thoroughly satisfies himself that the strapper's report is correct before he sets to work on his intricate problem of computing the capacity of the tank.

At least two tables are made for each crude oil lease tank, one for the pipeline company and the other for the oil producer. The engineer makes tables of all kinds for tanks of the smallest capacity up to 178,000-bbl. steel storage tanks and for concrete oil reservoirs. Many oddly shaped containers come to the engineer for measurements from refiners and natural gasoline plants.

Modern steel tanks give the tank gauging engineers and strappers less trouble than the old wooden tanks. The steel tanks contain little deadwood to displace oil. In an 80,000-bbl. steel storage tank the amount of deadwood would not make over 7 bbls. difference in some cases. But no two tanks of the same rated capacity are alike. A whole tank farm of 55,000 or 80,000 bbl. tanks which left the factory in uniformly cut plates may be subjected to more or less variation by the time they are riveted and ready for use. The strappers and engineers can take nothing for granted as to what a tank will hold. Every tank is a unit to be measured carefully whatever its size or whether it is of wood or steel. A separate record is kept of each tank and is indexed and filed where it can be found quickly if needs require it.

TRANSOCEANIC "PIPE-LINES" ARE BIG FACTOR

(Continued from Page C-50)

of a 5-bbl. shipment from Philadelphia to London! The first sizable oil shipment, however, was not arranged for till November of that year. In that month Messrs. Peter Wright & Sons chartered the 224-ton brig "Elizabeth Watts" to load a cargo of barrelled oil for London. It took several weeks to load the cargo.

The success of the first venture resulted in a rapid increase in transoceanic transport of oil, and in the year 1864, the entire exports from all United States ports amounted to 31,754,687 gallons. As early as 1863, oil was burned by the poorest inhabitants of Lebanon, Palestine, and in Syria—10 years later nearly 1,000,000 gallons were sent from America to Syria.

The first oil tanker—a sailing vessel, of course—to set sail from America to Europe was loaded with petroleum at Port Sarnia on the River St. Clair, Canada, and was lost in the Gulf of St. Lawrence, just as she was about to enter the Atlantic. The first iron sailing vessel was the "Atlantic", built in Great Britain in 1863. The "Charles" was probably the first vessel fitted with iron tanks for the transport of petroleum. She had 59 separate tanks, with a total capacity of 714 tons, and carried crude oil between the United States and Europe during the years 1869-72. Every year up to 1878, wooden sailers were adapted to carry oil in bulk, the holds themselves forming the tanks.

The start of the tank steamer may be dated around 1872. In that year, Palmer & Co. of Jarrow-on-Tyne, England, built the "Vaderland" of 2,748 tons for the Red Star Steamship Co. of Antwerp. She was followed by others of similar type in 1873 and 1874.

By 1885 the export of American oil in a single year was accomplished by over 1,000 vessels, mostly foreign ships, carrying from 2,500 to 14,000 bbls. per voyage. While in 1886, there were only about 12 bulk oil-carrying vessels, there were in 1891, between 70 and 80 running from America and Baku, Russia, to European oil importing points. The bulk carriers of the eighties were around 2,000 tons, only one-fifth to one-eighth the size of these launched during the past year or two.

The largest bulk oil tanker in the world is the "William Rockefeller," built in 1920 for the Standard Oil Co. of New Jersey. This ship has a gross tonnage of 14,054, and can carry more than 6,000,000 gallons of oil per trip.

The following figures are taken from the bulletin of the United States Department of Commerce and Llyod's Register of Shipping. They give number and gross tonnage of world tankers by nationalities:

Worl Tanker Tonnage
(As of June 30)

Flag.	1914 No.	1914 Gross Tonnage	1925 No.	1925 Gross Tonnage
American	54	150,685	478	2,411,719
British	185	837,410	352	1,936,121
Norwegian	10	40,296	44	247,353
French	3	11,232	26	136,910
Italian	3	16,007	31	131,436
Dutch	35	81,408	47	128,561
German	47	216,572	13	57,413
Japanese	4	19,808	13	47,266
Belgian	6	25,811	9	43,000
Danzig	..	.....	4	23,097
Spanish	1	672	9	31,333
Argentine	..	.....	9	25,700
Mexican	4	13,464	7	14,610
Swedish	1	2,092	4	14,111
Danish	1	735	2	11,561
Rumanian	..	.....	2	9,270
Cuban	..	.....	7	8,815
Venezuelan	..	.....	4	5,751
Philippine	..	.....	3	5,589
Brazilian	..	.....	1	2,947
Dominican	..	.....	1	1,979
Russian	6	14,371	1	1,624
Chilean	..	.....	1	1,270
Portuguese	..	.....	1	1,093
Uruguayan	..	.....	1	630
Chinese	..	.....	1	510
Total	386	1,441,196	1,072	5,310,631

Cut of Pipeline Map Is Largest Engraved South of Kansas City

The map of the trunk oil pipelines of the United States, appearing in this issue of The Oil and Gas Journal, is, according to the engraving company, the largest cut of a map made south of Kansas City and, possibly, in a larger territory. The original drawing was photographed five times, four of the negatives covering the territory from the east coast to Arizona and the fifth taking in the Pacific Coast area. In the process used, when the negatives were stripped on the special plate glass, both red and black lines were shown. It was necessary to paint out all lines to be shown in red and the negative then was photographed on to the metal which was of special size ordered from Chicago for the purpose. The negative then was washed and all black lines painted out and this negative then photographed on another piece of metal the same size as the first.

The negative of the map was so large the engraving company's equipment was not of sufficient size to photograph it onto the metal and a blue print mapping machine was borrowed for the photographing of the negative on to the metal.

After the map was photographed on to the metal, it required three men 60 hours to etch, rout and block the cut.

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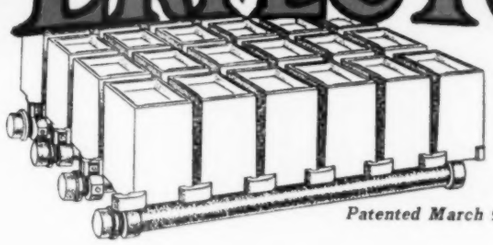

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Teamsters Fought Pipeline Building

Development of Transportation System in Early Days Remarkable in View of Many Handicaps Encountered

By George Turnbull

Down through the years that have elapsed since the start of the oil industry, the pipeline has been proven to be the logical method of transportation of crude petroleum from the wells. The successful operation of the first pipeline was to the oil industry as important as the railroad has been to the agricultural interests of the nation.

It was not long after the birth of the industry that it became very noticeable that transportation was one of the greatest keys to the situation. Waterways did not lead to every well or even to every field, even after the railroads were completed the crude had to be transported from the well to the lines of the carriers, roads were lines of mud and teamsters were demanding large sums for their work. All this placed an expense which was excessive on every barrel of oil.

The first wells on Oil Creek were so close to the stream that water transportation was for them the logical solution of the question. The petroleum could be loaded directly into boats or dugouts and then floated down the Allegheny River by a system of pond-freshets. Experts accustomed to dodging snags and rocks in inland streams managed the fleet and assumed the responsibility of delivering the oil to larger boats at Oil City for conveyance to Pittsburgh, at from $100 to $200 a trip. The pond-freshet was a great thing in its day with a romance all its own and rivalled log running or the rapids of the St. Lawrence for thrills. There was always the possibility of the boats being grounded and of fires. Yet for some years it was the accepted mode of transportation in the oil industry and the petroleum which a world used came by means of a stream which at times is only a few inches deep. At one time 2,000 creek and river boats were engaged in this novel traffic. Each freshet cost from $200 to $300 which was paid to the mill owners for storing the water and using their dams.

Wagon Train of 6,000 Teams

Then came the day when the oil development moved back from the sides of the creek and something in addition to water transportation was required to get the crude to the markets of the world. Thousands of horses were needed to haul this oil to the shipping points and the result was a wagon train which at one time consisted of 6,000 two-horse teams and wagons. Where today concrete roads cover this region thousands of teams in those early days churned up the ground in the quickly turned up roads into a sea of mud into which the horses often sank to their breasts and wagons were above the axles. Teamsters would pull down fences and drive through fields whenever possible until the valley of Oil Creek became almost a bottomless quagmire. This put the expense of the transportation of the oil up to an excessive figure until in January of 1866, it was $10.40 a barrel.

It was to remedy this situation and to cut down the expense involved in this department of the oil industry that the pipeline idea was conceived and carried through to success, although the road it traversed was rough and filled with all sorts of difficulties.

Firt Pipeline Suggestion

The first suggestion of improvement in transportation was in 1860, by General Karns at Parkersburg, W. Va. A salt water well he had resuscitated at Burning Springs pumped oil and he conceived the idea of a line of 6-inch pipe to run the product by gravity to Parkersburg. The war prevented the carrying out of the project.

At a meeting at Tarr Farm, in November, 1861, Heman Janes proposed laying a 4-inch wooden pipeline to Oil City, burying the line in a trench and letting the oil gravitate to its destination. James Reed, of Erie, contracted for the work but the paper was not signed and the Pennsylvania Legislature in 1862, considered a bill to authorize a pipeline from Oil Creek to Kittanning. The opposition of 4,000 teamsters engaged in hauling oil defeated the bill and the first effort to organize a pipeline company.

J. L. Hutchings of New Jersey brought to the oil country in the spring of 1862 a rotary pump which he had patented. To show its adaptation to the oil businesss he laid a string of tubing from Tarr Farm to the Humboldt refinery, below Plumer, set his pump working and sent a stream of crude over the hills to the refinery. The pipe which he used was of poor quality, the joints leaked and a good deal of oil was wasted, but the experiment proved that the pipeline idea was well founded.

Successful Line in 1865

The first successful pipeline to operate in the United States was owned by Samuel Van Sycle, who in August of 1865, completed a 2-inch line from Pithole to Miller Farm. There were two pump stations on this line, one a mile west of Pithole and the other at Cherry Run, and the pipe was 2 feet under the ground "so as to be out of the way of the farmer's plow." Eight hundred barrels a day could be run and the teamsters saw a great rival being built up which would eventually do away with their business. The pipeage charge was $1 a barrel on the line, at which rate it should have been a big money payer. Van Sycle traded heavily in oil and commanded plenty of capital until in 1866, the Culver bank failure ended his enterprise. The pipeline and its equipment were bought by William H. Abbott and Henry Harley.

In the fall of 1865, Henry Harley had started a pipeline from Benninghoff Run to Shaffer, the terminus then of the Oil Creek Railroad. This met with opposition of the teamsters and pitched battles were the result. The teamsters cut the lines, burned the tanks and retarded the work in every way possible. An armed patrol finally arrested the ringleaders, dispersed the mob and quelled the riot. The teamsters met their first big defeat in their attempts to prevent the march of progress in order to save their own business. The pipeline—2-inch tubing of extra weight—handled the oil expeditiously, a pump at Benninghoff forcing 600 to 800 bbls. of oil a day into the tanks at Shaffer. The system was a public improvement, personal interest had to yield and 400 teams were forced from the region by decreased business the week Harley's line first pumped oil.

New Era in Transportation

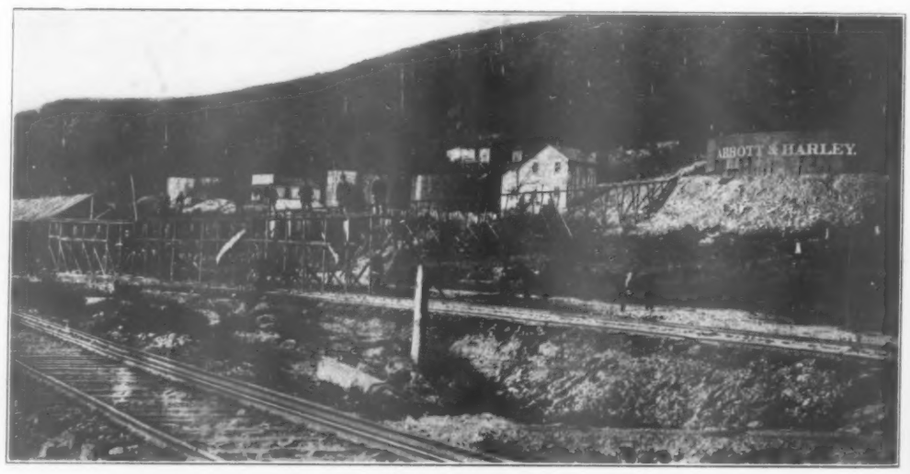
Avery and Heddon laid a line from Shamburg to Miller Farm. Abbott and Harley secured control of the Pithole line and laid branches to it. railroads penetrated the district, pipelines began to pump oil directly from the wells to the cars and refineries, and two men were able to load a train in a few hours. A new era in oil transportation was coming into being and the first threads of the pipeline system which later covered all of the oil fields were being put into operation. It was the era of discovery and experimentation in what is now one of the great branches of a huge industry.

Abbott and Harley, in 1867, combined with the Western Transportation Co., the only one empowered to pipe oil to railroad stations, and organized the Allegheny Transportation Co. One of the first directors was Jay Gould, who purchased a majority of the stock in 1868 for the Atlantic & Great Western and the Erie Railroads. The Commonwealth Oil & Pipe Co. was organized in 1871, in behalf of the Oil Creek Railroad. Harley managed to unite and reorganize the Commonwealth and the Allegheny as the Pennsylvania Transportation Co., with a capital of nearly $2,000,000, and 500 miles of pipe to Tidioute, Triumph, Irvineton, Oil City, Shamburg, Pleasantville and Titusville, centering at Miller Farm. Among the stockholders were Jay Gould, Thomas A. Scott, William H. Kemble and Mrs. James Fisk. The new enterprise absorbed a number of small lines and was considered at that time the acme of pipeline development.

In November of 1865, the Oil City & Pithole Railroad Co. began a railroad between the two towns, pushing the work with such vigor that the first train from Pithole to Oil City was run on March 10, 1869. Vandergrift and Forman equipped the Star Tank Line to carry oil in tank cars and laid the Star Pipe Line from West Pithole to the railroad. An unequivocal success from the start this line has been regarded as the real beginning of the present system of oil transportation.

Early Difficulties

The lower oil country enlarged the field. Lines multiplied in Venango, Clarion, Armstrong and Butler Counties. Each district had one or more lines to the nearest railroad. The Pennsylvania Transportation Co. secured a charter in 1875 to construct a trunk line to the seaboard. Nothing was done except to build more lines in the oil region. Clarion had a half-dozen, the Antwerp heading the list. Parker had a number and Butler was networked with them. It was then the custom to talk of trunk lines, call public meetings, subscribe for stock and then let the project die a natural death. Doctor Hostetter, a Pittsburgh millionaire, built the Conduit line from Millerstown to Pittsburgh. The Karns, the



Where the pipeline and the railroad met in early days of petroleum history

New and difficult problems then c

petition resulted in a rate war, charg
were lowered, business was done at
heavy loss and the weaker compani
went to the wall. The companies iss
certificates or receipts instead of pay
cash for the oil. When the producer
his oil into the storage tanks he was
certain that the certificates he recei
would have any value the next day. T
necessity of combining the badly ma
aged competitive companies into a
organization was urgent. The Union Pi
Line Co. acquired a number of lines
operated its system in connection w
the Empire Line. Under the Act of 18
Vandergrift and Forman organized
United Pipe Lines, into which numer
local lines were merged, the first gr
step in the direction of settling the q
tion of oil transportation for all ti
The United Lines erected hundreds
iron tanks for storage and connected w
every producing well. Needless pipes
pumps and stations were removed,
best appliances were adapted, improv
the system and diminishing its cost. U
form rates were established and ev
detail was systematized.

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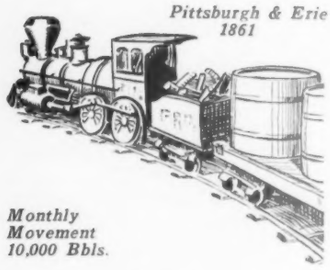
to the front. There were the questions of handling the enormous production of the Bradford Field, the increased distances covered by the oil fields and the construction of lines to the sea. Prior to the advent of the Bradford Field was a 4-inch line from the Butler Field to Pittsburgh, completed in 1875. Excepting this and 3-inch lines to Oil City and Raymilton none of the lines was longer than 12 miles. Many were gravity lines and others used small tubing and light pumps. The greater quantities and distances in the northern fields required greater power and larger pipe. The first 6-inch line was laid from Tarport to Carrollton in the spring of 1879. Two 4-inch lines had preceded it and a 4-inch line from Tarport to Kane was completed in the same season, five 6-inch lines following later. The first long distance line, a 5-inch pipe from Hilliards, near Petrolia, to Cleveland, was completed in the summer of 1879. Trunk lines to the eastern coast were begun in 1879-80. The trunk line to Philadelphia starts at Colegrove, McKean County, and extends 235 miles, being 6-inch pipe with

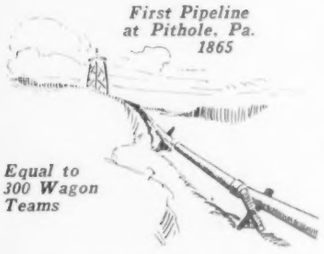
Northern Pennsylvania 1859-1865

1865 Production 2,498,000 Bbls.



Pittsburgh & Erie 1861

Monthly Movement 10,000 Bbls.



First Pipeline at Pithole, Pa. 1865

Equal to 300 Wagon Teams

a 5-inch branch of 66 miles from Millway to Baltimore. Starting at Olean, two 6-inch lines were paralleled to Saddle River, N. J., one connecting with the refineries at Bayonne and the other going under the North and East Rivers to Hunter's Point, Long Island. The New York line is double under the Hudson River, one pipe inside another, with tight-fitting sleeve joints, an engineering triumph. The United Pipe Lines Association moved steadily forward, avoiding the pitfalls that had wrecked other systems. It bought or combined the Oil City, Antwerp, Union, Karns, Grant, Conduit, Relief, Pennsylvania, Clarion and McKean divisions of the American Transfer, Prentice, Olean, Union Oil Co.'s at Clarendon, McCalmont at Cherry Grove and smaller lines, covering the oil region from Allegheny to Butler. The United owned 3,000 miles of lines, 35,000,000 bbls. of iron tankage and 118 local pump stations. Even these extraordiary resources were strained by the overflowing demand. in 1880, the National Transit Co. absorbed the American Transfer Co. and on April 1, 1884, it acquired the plant and business of the United Lines.

Improvement in Power

With all the advancement made in the pipeline business since the days of the start of the industry, still the changes in pipeline operations have not been great during the past 40 years except in the matter of improved pumping equipment. The first pumps were steam affairs, first there were single pumps and then these were displaced with double pumps, the gas engine pump followed with power pumps.

Work in the early day pump houses was done under far different conditions than now. Coal was the fuel used and often boilers were fired by this fuel hauled over the mountains at places where large gas wells were but a few feet away. None in those days realized the value of natural gas for this purpose and the most valuable fuel in the world was allowed to flow into the air while a much more unsuitable one was being used nearby.

In the early days telegraph and telephone lines were unknown in the oil fields and the engineers at the pump stations decided whether the line was working in perfect order by listening to the action of the engine. Then if a leak was considered probable the line was inspected until it was found. Despite all this the wastage of oils in the pipelines was remarkably low.

The night shift pump station engineers worked under great handicaps. Electric lights were unknown and the pump rooms were generally lighted by the rays of a lantern placed outside the building and shining through a window. Later the pipeline companies purchased locomotive headlights and placed them outside the windows of the building. With such poor light engineers had to make such repairs as were needed at night and it is not any wonder that mashed fingers were a mark of the trade and profanity prevailed around the engine houses.

The first oil burner under a boiler was employed in a pipeline pump station located at Shippensville, Clarion County, but it was far from being a success. It had been purchased by the late Maj. J. B. Maitland and was discarded the same night that it was first placed in use. The engineer in charge of the plant decided before many hours had passed that it was not capable of producing enough steam and then disconnected it and resumed the work of shoveling coal.

Lines Still in Use

Some of the early day pipelines were so well made and so well laid that they are still in use. Probably the oldest pipeline in the world is that which operated from Turkey City to Oil City. Some of it still contains the original pipe, although much of it has been replaced in the years that have intervened. Another stretch of old pipeline is that between the Pleasantville district and Turkey City. This was laid prior to 1879 by the Sandy Pipe Line, which was later absorbed by the United Pipe Lines and which is now a part of the National Transit system. This old pipe is found to be in excellent condition whenever occasion requires that any of it be taken up. Most of the deterioration is on the inside of the pipe and is generally found in the low places. It is due to the action of salt water on the pipe. About a year ago the National Transit Co. took up some old pipe in the Pleasantville district for more than two score years and found it in such excellent condition that it is being saved for river crossings.

Mechanical genius has perfected the pipeline systems of the country and has brought about an era of pipeline transportation. It takes the old-timers to fully realize the convenience and the economy of the pipelines. These put the producer in direct communication with the carrier and give him a market at all seasons and under all weather conditions. No longer do tugging teams of horses pull wagons loaded with crude oil over roads of mud and the day of the steamer on the Allegheny River and the freshet on Oil Creek are now so long past that few can be found who recall them.

WHY CRUDE OIL PIPE-LINES ARE CONSTRUCTED

(Continued from Page C-9)

through its lines unless there were buyers to accept this crude after it was transported.

Consequently, a market must first be obtained for the crude before a pipeline is constructed. Other buyers, not located along the lines of the company building the pipeline must be considered and their requirements determined. This must be done in the case where the pipeline company's lines already in operation cover a large territory permitting consideration of building the new line to connect with the already established trunk lines at widely separated points. This factor was considered by the Prairie Pipe Line Co. in its decision to construct the line from Pampa or Kings Mill in the Texas Panhandle to Ringling, Okla. Ringling is a point on the main trunk line of the Prairie Pipe Line Co.'s system and building the line from the Texas Panhandle to that place will permit shipment of Panhandle crude either north, south or east. At Ringling connection can be made with the trunk line of the Oklahoma Pipe Line Co. which extends to DeQueen, Ark., where transfer can be made to the Standard Oil Co. of Louisiana's line to the big refinery at Baton Rouge, La. Hence, if customers of shippers using the Prairie Pipe Line Co., at Whiting, Wood River or Neodesha do not desire as much Texas Panhandle crude as the line will carry, some of this crude can be routed to Baton Rouge for the Standard Oil Co. of Louisiana.

Extensions to Lines

No set rule can be followed in the determination to construct a pipeline either to a new field or to a new well. Every case must be considered separately and decided on its own merits. This is true either in the building of a trunk line or a small gathering line. Questions involved in the decision to build a new line are the production in sight, that is how much crude there is in storage for immediate shipment, the daily production of the well or the field, the gravity of the crude, and the probability of the production being maintained over a long period or of the area being so promising as to attract other development which would tend to boost production. Also how far away from the new well or field is located the nearest pipeline of the company considering the building of the extension.

Crude oil producers would save themselves much grief at times if they would consider the problems confronting the pipeline systems and be guided accordingly. A wildcat well, drilled far from existing pipelines, even though it be a big producer, would bring little return to its owner if he could not dispose of his crude. Unless he is along the line of a railroad where the oil could be sent to buyers in tank cars, the operator is just out of luck until the whole area is developed and sufficient production attained to warrant the vast expenditure of building a pipe line to the section. That is what happened in the Texas Panhandle. It has been known for years there was oil in that territory but without adequate facilities for the marketing of the crude, what benefit would it be to an operator to drill a gusher and then be forced either to cap the well or build storage to hold the production?

Even though a well be drilled just a mile from a pipeline, that well must be a good producer and give promise of maintaining its production over a fairly long period before a pipeline company would be warranted in building that mile of line. The list price of 4-inch pipe is about $1.09 a foot so it can be seen readily the building of a line 1 mile long involves quite a sum if only one well is to be served.

GAS ENGINES USED ON MAGNOLIA'S LINE

(Continued from Page C-121)

pleted. When all stations are in operation they will be spaced 18 miles apart and the line will be able to handle 28,000 bbls. of crude daily. The line is 53 miles from El Dorado to Sarepta; 55 miles from Sarepta to Latex; 50 miles from Latex to Center; 50 miles from Center to Kirbyville and 49 miles from Kirbyville to Beaumont.

Because the oil carrier parallels the gas line the Magnolia was offered a peculiar economic condition that is not found along other oil lines. Gas burning engines will be installed in the pump stations save at two in Arkansas. They are figured to prove considerably more economical in fuel consumption than oil burners that use 10 bbls. of oil to pump a certain amount of oil where steam stations would consume 100 bbls. of fuel. The installation of the gas burners marks their entrance into this district for oil pumping stations. Save at El Dorado and Three Creeks, all stations will have three 150-horsepower Bruce-MacBeth gas engines. In the Arkansas station three 150-horsepower De La Vergne oil engines will be used.

The pump stations are all-steel buildings brought on location in sections and set up. At present two more stations are being built on the northern end of the line and a couple on the southern end. The capacity of the line will not be increased until all of the stations are completed.

Another feature of the line is that no heaters have been installed in any of the stations. Conditions may force the adoption of heaters but it is planned to pump the heavy oil until cold weather will not permit the movement of Smackover crude without it being heated. When that condition arises light oil storage will be pumped into the lines. Movement of the oil is checked by telegraph and telephone.

Contributing to the line is a 42-mile 4-inch screw line running from the Bull Bayou fields to Latex station and an 11-mile spur connects the trunk with Caddo. Two 55,000-bbl. tanks will furnish ample storage at each of the stations. Tank farms will be located at Bull Bayou, Latex, Cotton Valley, Haynesville, Sarepta and El Dorado. The main tank farm will be in El Dorado.

GETTING RIGHT OF WAY IS NO EASY JOB

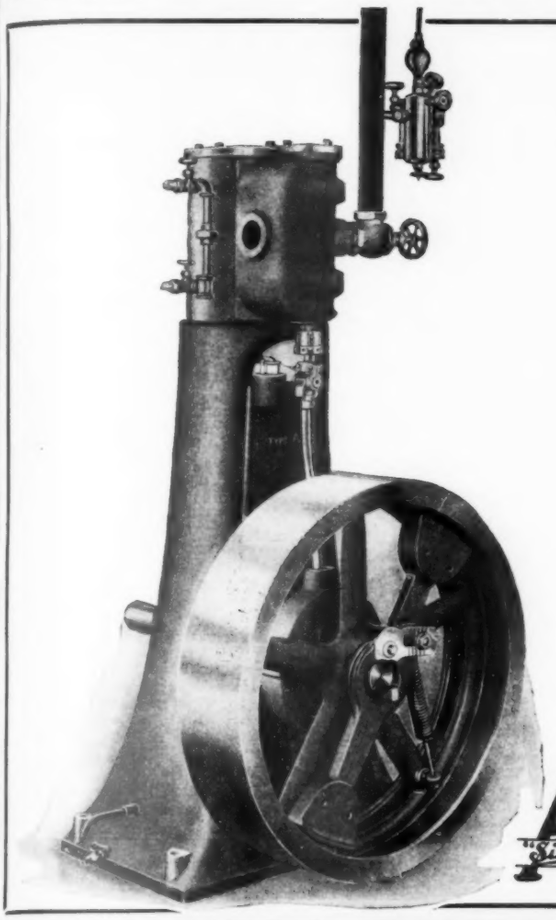
(Continued from Page C-26)

for many years and leaks developed at times, the old man never assessed any damages against the pipeline company and steadfastly refused to accept any money in payment for what the pipeline company felt were damages, he stating the land was not hurt and he had not suffered any damage and, consequently, being an honest man, could not accept money he was not entitled to. Incidentally, when the right of way agent came to him with the check in payment of the difference in his right of way money and that of his neighbors, Mr. Darwin said, "Well, there are two honest men in the world—myself and yourself."

Big Majority Honest

C. F. Sessinger, representing a company that furnishes bonds for honest of employes says 90 per cent of the people in this country are potential crooks. He claims experience has shown him that necessity plus opportunity will show 9 out of 10 to be thieves.

Mr. Gibson of the Prairie Pipe Line Co. takes an entirely different view. He says his records covering many years of dealing with all kinds of persons in all walks of life show that 95 per cent of all the people are absolutely honest and that 5 out of every 100 who might be termed dishonest, 3 of these were placed in the category as the result of false information given them or by reason of persuasion of others.



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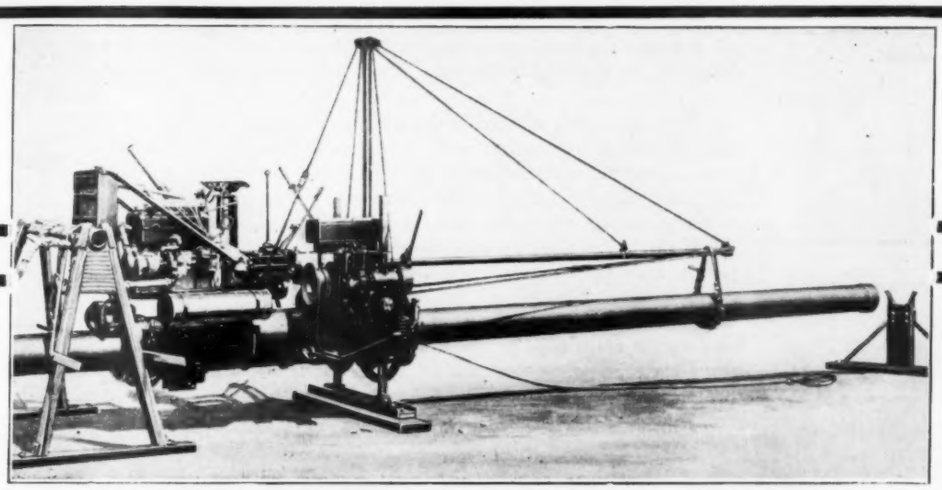

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Above illustration shows one of our larger machines capable of laying 8, 10 and 12-inch pipe. This machine was shipped to the Andian National Corp., Cartagena, Colombia, S. A. The Crusader Pipe Line was built by our machines exclusively.

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CALIFORNIA PIPE LINE MACHINE COMPANY
J. J. MAHONEY, President
KANSAS CITY, MO.

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Yet Easy to Take Apart

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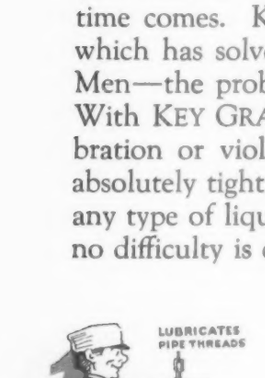

KEY GRAPHITE PASTE is entirely different from any other joint compound. It is an acid-resisting, non-corrosive, non-oxidizing, expansible filler containing no oil or grease. You cannot expect to make *an oil-proof joint if the filling compound is mixed in oil. Use water only, for thinning KEY GRAPHITE PASTE and apply with a brush—first being sure that all parts on which it is applied are thoroughly cleaned and free from oil and grease.

After being properly applied to the joint, KEY GRAPHITE PASTE gradually works its way into every little hole and crevice—and stays there. At temperature of 212° or above, it **expands and carbonizes and there is no chance of it disintegrating or running out past the gasket or faces of the joint. This stabilizes the union of the two sections of the joint and makes it permanently tight and leak-proof.

When it is necessary to break the joint, this can be done without danger of damage to the fittings, as KEY GRAPHITE PASTE does not corrode. It does not injure gaskets in any way, but prolongs their life.

*Test No. 1—Rub a little of the paste on the palm of your hand. Pour a little gasoline on it and note that the paste is not washed away by the gasoline. Now wash it off with soap and water.

**Test No. 2—Place a small quantity of KEY GRAPHITE PASTE on the bit of a screw-driver. Hold a match under it and see it expand.

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KEY GRAPHITE PASTE is Used by Seventy Per Cent of the Larger Refineries in the United States

Many Refiners Have Own Pipelines

Operation of These Smaller Lines Conforms Greatly to Methods Employed by the Major Pipeline Companies

By Neil Williams

Pipelines have played an important part in the development of the independent refining industry. Refineries have grown only as rapidly as facilities for obtaining an adequate supply of crude at a reasonable cost have expanded and reached out to more and more distant oil pools.

In the beginning of the petroleum industry, a small plant could be set up in an oil field and operate successfully, depending on crude delivered by tankwagons from tanks of adjacent producers. That was in the day when oil fields were fewer and production centralized; when refineries were much smaller and had plenty of oil at hand, and when marketing problems were not as involved.

As nearby crude sources dwindled, refineries had to look farther and farther away for crude. Tank cars served to some extent to furnish the increasing need of oil, but to be assured of supply of raw material to permit a proper growth, a refinery had to have a closer contact with the producing areas.

Refineries Have Pipelines

Today a refinery without pipelines, or some kind of a gathering system, is like a great city without its network of water lines. The more extensive the lines, the more intricate the gathering system and the more sources of crude tapped, the greater is the assurance of an abundance of oil on which to operate.

As modern refineries can not move from crude supply to crude supply, it is necessary to bring the crude to the refinery. Consequently, the development of the independent refining industry is linked very closely with the expansion of pipelines and gathering system facilities.

Practically every independent refinery in the country has some kind of a pipeline system in this day of refining operations. It may be nothing more than a small 2-inch pipe connecting the plant with a well, but nevertheless it furnishes the life blood which enables the plant to continue existence. On the other hand, some independent companies have as complete systems as some of the major crude transporters.

The part played by pipelines in the development of the independent refining industry is demonstrated in the comparatively few plants at present depending on tankcars to furnish their crude supply. One has but to make a survey of the industry to observe the great number of plants shut down simply because they had no gathering system or pipeline connections.

Some of the plants originally were in the heart of an oil field, but, failing to extend lines farther and farther out to more distant fields when production locally waned, naturally died. Other companies have attempted to locate plants centrally, either from the railroad or marketing standpoint, but without provision for pipelines to a crude supply. These also have not found it expedient to continue operations.

Pipelines Aid Growth

On the other hand, plants which have included pipelines as a part of the necessary refinery facilities on the whole have grown. Some, with extensive gathering systems, now are numbered among the most important plants in the country. With exceptions, the greater the gathering system and the more rapid its expansion, the more important is the refining company.

In many cases it is more advantageous to have refineries near or in the heart of marketing territories for the finished products. For instance, Chicago is a refining center. Plants there have no crude supply at hand, but each is guaranteed ample raw material through pipeline connections with the Mid-Continent or other areas. While these plants are listed among the Standard or other major companies their problems are similar.

The Roxana Petroleum Corp. also is building a large plant out of Chicago at Hammond, Ind., but before construction was started a right of way for a pipeline from the Wood River plant was obtained and work started on the line. Building of the plant was delayed until it was assured that a pipeline was possible.

The companies owning these plants are among the largest and the lines serving them are among the major crude transporters of the country, but the general problems of the smaller independent refiner are little different on the whole than those of the large companies. In most cases the Standard and larger companies are served by major trunk lines and common crude carriers while independent companies must build pipelines of their own, yet, in either case, a growing gathering system is required.

Systems Quite Similar

Pipelines and gathering systems in themselves also are little different. Whether owned by the large major crude transporters of the country or by small independent refiners, their one purpose is to gather the crude from the producer and deliver it to the refiners. Lines of the major pipeline companies may be more extensive and trunklines longer, but otherwise the individual systems of the independent refiners are very similar.

The fact that the major crude transporters furnish raw material to many large Standard refineries while a pipeline system of an independent company furnishes oil only for that one company's plants also makes practically no difference in the actual operating methods. Some systems owned privately by independent refiners even rival those of the major lines in their intricacy and completeness.

Where the large transporters may use 8 or 10-inch pipe on their main lines, independent refiners may lay 3 and 4 inch pipe, yet the systems are identical with their main lines, laterals and other feeder lines spreading out over the oil fields.

Some independent refiners have such extensive systems that they have been forced to organize separate pipeline companies to manage them. However, these independent pipeline companies, such as the Cosden Pipe Line Co., the Pierce Pipe Line Co. or the Consolidated Pipe Line Co., carry oil only for the refineries of the company of which they are subsidiaries, while deliveries of the Prairie Pipe Line Co., Sinclair Pipe Line Co. and other similar interests are more extensive and varied.

Ordinarily, however, pipeline systems of independent refiners are managed only as a department of the company rather than an individual company. This is because the independent systems generally are on a smaller scale and really are only a part of the refinery facilities.

Carry Only Own Crude

The fact that the gathering systems of independent refineries carry oil only for their own plants and are not common carriers is perhaps the only important distinction in operations between these smaller systems and those of the major crude transporters. And yet the line between common carrier and an independent system is very close.

Whether some of these independent refinery pipeline systems could be forced to become common carriers, as was the Prairie Pipe Line Co., the Sinclair Pipe Line Co. and others, is purely a question of law. In years past there have been many law suits involving this question, but lately with every company anxious to get all the crude possible there has been little occasion for a dispute on this point as most all companies are bidding for all the oil they can get.

Perhaps one important distinction between a common carrier and independent company not declared a common carrier is the theory that the lines of the independent company are only a part of that company's refinery facilities, being used to carry crude bought by that company for that company's own use.

On the other hand, the crude in lines of the present common carriers is not, according to court decisions, property of the pipeline companies. These companies, owning no refineries, are transporting the oil only to refineries owned by other companies.

However, there are lawyers who believe that the fact that the independent lines serving only one refinery would not keep these lines from being declared common carriers in case of necessity, especially if the independent refiners operate their pipeline systems under separate companies. They argue that if a producer has oil which must be moved he could force an independent refiner to carry the oil through its system if a market were assured.

However, there is nothing which could compel an independent refiner to buy any oil he did not wish or could not use so whether his lines could be declared a common carrier, or not, is of no real importance. There is a statute on the Oklahoma books, passed a number of years ago called the Yeager-Strain common crude purchasers law, which provides for the forced purchasing of crude from the producers but there never has been an occasion to test the validity of this act.

Individual Problems

Operation in pipelines has been described in other parts of this issue in connection with the major lines, but as this phase of the independent systems is little different there is no necessity of mentioning it here. Every independent refiner naturally has a few individual problems to handle in connection with his lines, but the general operation is the same.

Line walkers, gaugers, engineers, are common to all, while pipes, pump station equipment, telephone and telegraph lines are necessities available to all. Smaller systems perhaps do not require private telephone and telegraph lines as do the lines of the larger companies, but even some of the larger independent companies have such means of communication and separate departments for this purpose.

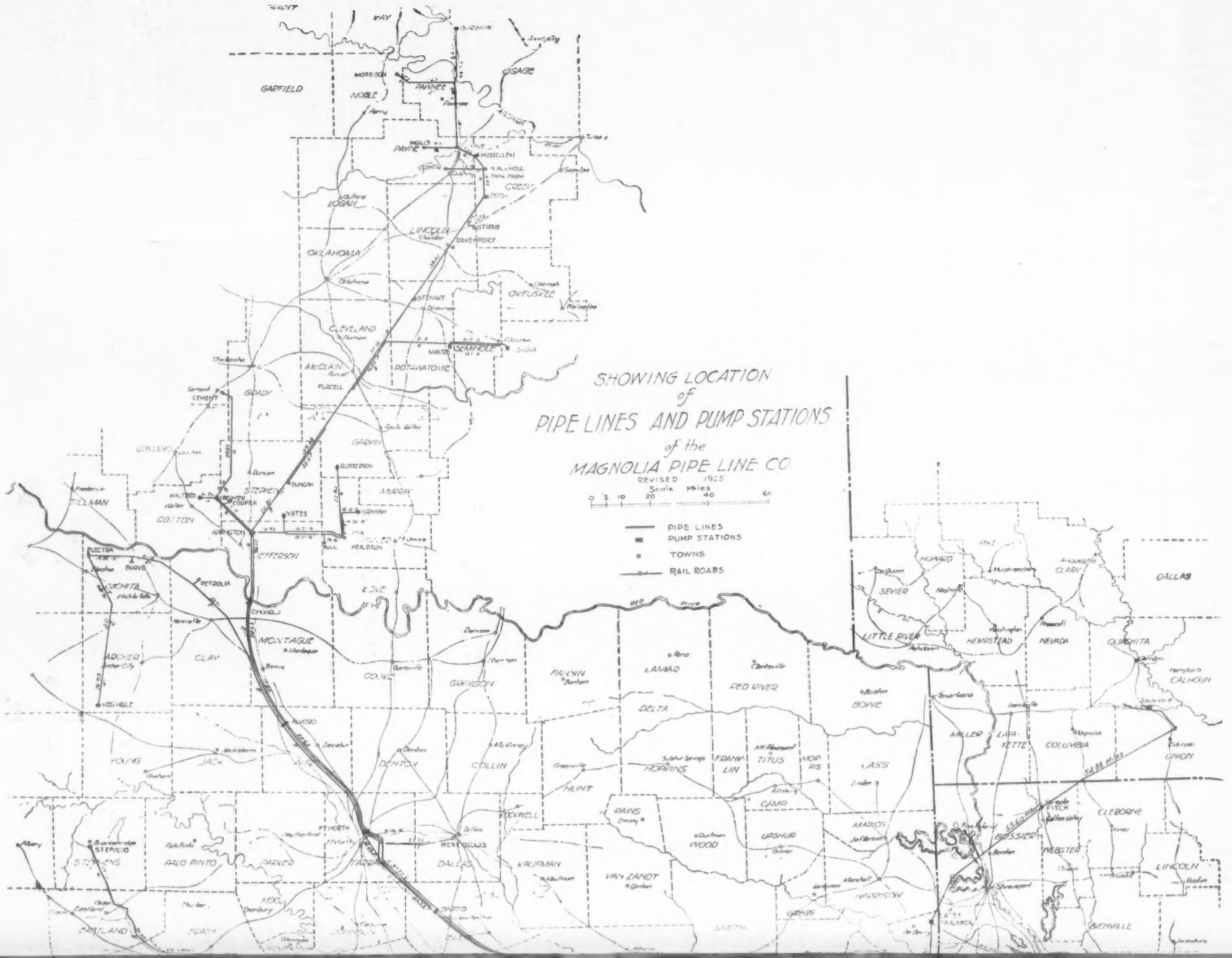
Pump stations on lines of independent refiners are just as modern as those on the systems of the biggest crude transporters, employing Diesel, gas or electrical motors for forcing the crude through the lines. A few small refiners with short lines have been favored with a location such that crude could be brought to the plants by gravity, but if a pipeline system spreads out to any extent the usual pumping system must be installed.

Assures Constant Supply

Although it is possible for an independent refiner to buy crude from other companies or nearby pipelines, they find it more practical to build systems of their own. In the first place a privately owned system assures a refiner of an adequate supply of crude without fear of being cut off at any minute if he were buying from another company. From an independent refiner's standpoint this is perhaps the most valuable asset in a pipeline system.

A privately owned pipeline system also enables the refiner to obtain the particular crude he wants and when he wants it. One large Mid-Continent refiner points out that his company's operations require four distinct types of crude, each of which is run separately. To obtain the special crudes is one of the chief reasons this company is operating its own lines. Ordinarily in pipeline operations all crudes are mixed and run together through the lines.

CONSTRUCTION OF A PIPELINE IN MEXICO


SHOWING LOCATION
of
PIPE LINES AND PUMP STATIONS
of the
MAGNOLIA PIPE LINE CO
REVISED 1925
Scale Miles
0 5 10 20 40 60
PIPE LINES
PUMP STATIONS
TOWNS
RAIL ROADS
GARFIELD
NOBLE
PAWNEE
OSAGE
LOGAN
LINCOLN
OKLAHOMA
OKFUSKEE
CLEVELAND
SEMINOLE
POTTAWATOMIE
McCLAIN
GRADY
PURCELL
GARVIN
STEPHENS
MURRAY
JEFFERSON
COTTON
TILLMAN
MONTAGUE
CLAY
ARCHER
WICHITA
YOUNG
JACK
WISE
PALO PINTO
PARKER
TARRANT
DENTON
COOKE
GRAYSON
COLLIN
HUNT
FANNIN
LAMAR
DELTA
RED RIVER
BOWIE
FRANKLIN
TITUS
MORRIS
CASS
CAMP
UPSHUR
WOOD
RAINS
VAN ZANDT
KAUFMAN
DALLAS
ELLIS
HILL
JOHNSON
SMITH
GREGG
HARRISON
MARION
PANOLA
SHELBY
SABINE
NACOGDOCHES
CHEROKEE
ANDERSON
HENDERSON
RUSK
SMITH
GREGG
UPSHUR
WOOD
CAMP
TITUS
MORRIS
CASS
MARION
PANOLA
HARRISON
SHELBY
SABINE
NACOGDOCHES
CHEROKEE
ANDERSON
HENDERSON
RUSK
SEVIER
LITTLE RIVER
HOWARD
CLARK
DALLAS
HEMPSTEAD
NEVADA
OUACHITA
CALHOUN
MILLER
LAFAYETTE
COLUMBIA
UNION
OUACHITA
CLEBORNE
BIENVILLE
WEBSTER
LINCOLN
BOSSIER
CADDO
PITCH
Fallon Valley
54.88 Miles
Shreveport
Marshall
Jefferson
Longview
Tyler
Palestine
Crockett
Lufkin
Nacogdoches
Center
Henderson
Kilgore
Gladewater
Mineola
Quitman
Winnsboro
Pittsburg
Daingerfield
Mt Pleasant
Clarksville
Paris
Sulphur Springs
Greenville
Commerce
Bonham
Denison
Sherman
Gainesville
Decatur
Bridgeport
Weatherford
Mineral Wells
Stephenville
Albany
Graham
Throckmorton
Seymour
Vernon
Quanah
Childress
Memphis
Clarendon
Wellington
Matador
Paducah
Crowell
Benjamin
Knox City
Munday
Haskell
Rule
Stamford
Anson
Hamlin
Sweetwater
Roscoe
Colorado
Big Spring
Snyder
Ballinger
Coleman
Brownwood
Cisco
Eastland
Ranger
Breckenridge
Albany
Abilene
Sweetwater
Roscoe
Colorado
Big Spring
Snyder
Ballinger
Coleman
Brownwood
Cisco
Eastland
Ranger
Breckenridge
Albany
Abilene

JEFFERSON
CHAMBERS
LIBERTY
HARRIS
GALVESTON
HARDIN
ORANGE
NEWTON
SABINE
SAN AUGUSTINE
JASPER
TYLER
ANGELINA
NACOGDOCHES
POLK
TRINITY
WALKER
MONTGOMERY
SAN JACINTO
HOUSTON
LEON
MADISON
GRIMES
WALLER
AUSTIN
BRAZORIA
FORT BEND
WHARTON
MATAGORDA
JACKSON
COLORADO
LAVACA
DEWITT
VICTORIA
CALHOUN
REFUGIO
ARANSAS
SAN PATRICIO
NUECES
KLEBERG
WILLACY
BROOKS
KENEDY
JIM HOGG
STARR
ZAPATA
WEBB
DUVAL
MCMULLEN
LA SALLE
MAVERICK
ZAVALA
DIMMIT
FRIO
MEDINA
UVALDE
KINNEY
VAL VERDE
EDWARDS
REAL
BANDERA
KERR
KENDALL
GILLESPIE
BLANCO
HAYS
COMAL
GUADALUPE
CALDWELL
GONZALES
FAYETTE
BASTROP
BURLESON
WASHINGTON
BRENHAM
LEE
BURNET
LLANO
MASON
MILLS
LAMPASSAS
SAN SABA
WILLIAMSON
CORYELL
BELL
LIMESTONE
FALLS
ROBERTSON
BRAZOS
GROESBECK
LEON
HOUSTON
TRINITY
POLK
CLEVELAND
LIBERTY
JEFFERSON
GALVESTON

A BRADEN BUILDING *is a better building*

When the question of securing building service next comes up, let these facts decide you:

1. Braden Buildings are made in the heart of the Oil Country, by men who have studied every phase of the housing problem for the Petroleum Industry.
2. Central location means lower freight rates, quicker delivery, and better handling.
3. Standardized for volume, Braden Buildings cost less, yet meet every building need, because they are designed right, made right and priced right.

For years these facts have been deciding factors in the selection of most of the larger oil companies.

We will be pleased to submit blue prints and quotations on any one-story building, ranging from the smallest to the largest. Address

BRADEN STEEL & WINCH COMPANY
Tulsa, Oklahoma

Manufacturers of Reliable Braden Products

BRADEN STEEL BUILDINGS

LAY YOUR LINE LIKE THIS—
and save money—time and labor

Note the ease with which pipe—tubing—casing, is handled by the R-B Winch-equipped trucks in the photos below.

On pipe laying jobs throughout the Oil Country, R-B Winches have proved their economy, speed and power; many Oil Companies have standardized on them for all their trucks, regardless of the class of service to which their trucks are put. For R-B Winches perform every winch duty with matchless ease and efficiency.

Considering their small first cost and the fact that maintenance costs are almost negligible, the R-B Winch offers more return for the investment than any other type or make of winch on the market. We ask you to check this statement with the experience of any R-B Winch owner. Or better still, ask any oil country truck distributor for a demonstration; or write direct for further information.

BRADEN STEEL & WINCH COMPANY
Tulsa, Oklahoma
Sole Manufacturers

THE R-B WINCH

Operates independent of wheel *no need of jacking up wheel*

BURT

Large Capacity Unit Type Oil Filter

The filtering capacity has been greatly increased at no extra cost. The improved Burt Unit Type filters give 50% to 75% additional capacity over the old ones.

This filter meets every requirement of the pipe line pumping stations, its unusually high efficiency makes possible a greater filtering capacity with economy of space over other type filters.

We maintain a complete Engineering Department. This service is always available at no extra cost. We will ship one of these or any other type filter on a 30-day free trial basis to responsible parties to demonstrate their high efficiency.

We manufacture Burt Oil Reservoirs in both standard cylindrical type or special rectangular storage capacity tanks with sections to hold various kinds of petroleum or crude oil. *Write for full particulars and prices.*

Do You Burn Fuel Oil?
If so we can keep your burners free from grit or dirt, hence insuring perfect combustion and a clean steady flame at all times. Specially designed and packed Burt filters do the work—write for details.

Crankcase Oil Can Be Reclaimed
so as to give same efficient service as regular fuel oil and at practically no cost. Service stations would probably be glad to have you haul it away. Also provides storage capacity which can be increased if necessary with a Burt Oil Reservoir.

The Burt Manufacturing Company
929 S. High St., Akron, Ohio
Pioneer Oil Filter Manufacturers

STATISTICAL RECORD OF LAREDO DISTRICT

By P. L. McGreal

HOUSTON, Tex., Oct. 4.—Harvey L. Fansier of Laredo has compiled statistics concerning the various pools in the Mirando-Laredo district, which are very interesting. The district includes sections of Webb, Jim Hogg, Zapata and Duval Counties, extending along an irregular escarpment for 35 miles from north to south.

The district was opened May 1, 1920, with a well of the Mirando Oil Co. in Zapata County, 22 gravity heavy crude, light in gasoline content but suitable for lubricating stocks. Development work was slow in the beginning, due to the isolated position of the new pool, uncertainty regarding the value of the oil, and lack of capital. Laredo men were the first investors to help with the development. As other pools were opened, Oklahoma and Texas men entered the section. O. W. Killiam is the outstanding figure in the development of the Mirando-Laredo Pools.

The country is somewhat difficult to operate in, being covered with mesquite brush that is almost a jungle.

Laredo is the oil capital of that section and has improved wonderfully in five years. The narrow streets, suggestive of old Mexico towns, have been widened and paved. Modern hotels have been erected and 8-story business blocks have replaced the old wooden shacks. The city claims a population of 42,500. Oil has played a prominent part in the improvements.

Dr. M. P. Cullinan is the pioneer oil and gas man of all that section bordering on the Rio Grande. He has been there 18 years as president of the Border Gas Co., the only concern in the United States that exports gas. The company has a line crossing the river into Nuevo Laredo, Mexico. The doctor is well known among oil and gas men all over the country. He is a brother of J. S. Cullinan, one of the really big men in the industry. Frank Cullinan of Dallas is another brother. It is no stretch of the imagination to say the Cullinan brothers have been leaders in the development of the oil and gas industry in the southwestern states.

Mr. Fansier's recent check-up of the various pools gives the daily average production at 16.120 bbls. from 552 producing wells. They are located as follows:

	No. Wells	Daily Ave.	Ave. Per Well
Webb County—			
Schott Pool	112	862	7 7/10
Aviator Pool	142	6,114	43 1/4
Mid-Ojuias Pool	63	700	11 1/10
Wolcott	35	255	10 2/10
Car-Tex	1	201	201
Jim Hogg County—			
Henne, Winch & Fariss	96	2,500	26 1/10
Randado	89	4,813	54 2/10
Zapata County—			
Mirando Valley Pools	17	136	8
Duval County—			
Cole-Bruni	7	639	91
Total	552	16,220	29

August Report

The report shows the pipeline runs and well connections during the month of August. There are seven lines and buyers in the pools as follows:

Line—	Wells	Bbls.
Texpata P. L.	61	84,450
Magnolia Pet. P. L.	207	133,026
Humble P. L.	169	186,919
Crown Central Pet.	82	60,985
Laredo Oil	4	964
Houston Oil	3	5,667
Randado Pipe Line	25	33,026
Total	553	505,036

Total production of Laredo Field from May, 1920, to August 30, 1926:

Texpata P. L.	4,962,848
Magnolia Pet. Co.	3,164,231
Humble P. L.	1,487,483
Crown Central Pet.	958,489
Laredo P. L.	209,260
Houston Oil	29,204
Randado P. L.	141,231
Total	15,952,745

The Humble Pipe Line Co. has run over 150,000 bbls. through its 8-inch line from Bruni station on the Tex-Mex Railway eastward to Engleside, near Corpus Christi. The distance is 107 miles.

The Magnolia Pipe Line Co. is extending its 8-inch from Luling southwestward to Mirando City, a distance of 180 miles. The Magnolia company has about 775,000 bbls. in storage at Oilton, near Mirando, which will be run through the extension and the Luling-Beaumont line to the refinery.

The Houston Pipe Line Co., a subsidiary of the Houston Oil Co., is extending its 14-16-inch line from Lucas, Live Oak County, south to connect with the gas wells in the Cole-Bruni Pool. The company is also laying a line to furnish natural gas to the Freeport Sulphur Co. at Hoskins Mound and Freeport in Brazoria County. The company is now transporting and selling an average of 50,000,000 feet per day to industries in Houston and along the ship channel. In addition it is furnishing gas to the Texas-Gulf Sulphur Co. at Gulf, Matagorda County, and the Sugarland industries at Sugarland, 25 miles southwest of Houston. The refining plants of the Humble Oil & Refining Co. at Baytown and the Galena Signal Oil Co. of Texas are also being supplied with gas by the company. The gas is piped from the fields at Lucas, Live Oak County, and Refugio, Refugio County.

The Houston-Gulf Gas Co. is transporting and selling around 25,000,000 feet per day to Houston industrial concerns, piping the gas from Refugio County.

CALIFORNIA RECEIPTS AND PETROLEUM IMPORTS

Imports of crude and refined oils at the principal United States ports for the week ended September 25, totaled 1,853,000 bbls., a daily average of 264,714 bbls., compared with 859,000 bbls., a daily average of 122,714 bbls. for the week ended September 18, and a daily average of 190,464 bbls. for the four weeks ended September 25.

	Week Ended Sept. 25	Week Ended Sept. 18
At Atlantic Coast Ports—		
Baltimore	298,000	.....
Boston	135,000	.....
New York	697,000	533,000
Others	211,000	.....
Total	1,341,000	533,000
Daily average	191,571	76,143
At Gulf Coast Ports—		
Galveston dist.	111,000	53,000
New Orleans and Baton Rouge	261,000	268,000
Port Arthur and Sabine dist.	50,000	.....
Tampa	90,000	.....
Total	512,000	326,000
Daily average	73,143	46,571
At All United States Ports—		
Total	1,853,000	859,000
Daily average	164,714	122,714
Daily avr. 4 weeks	190,464	168,107

Receipts of California crude and refined oils at Atlantic and Gulf Coast ports for the week ended September 25, totaled 828,000 bbls., a daily average of 118,286 bbls., against 606,000 bbls., a daily average of 86,571 bbls. for the week ended September 18, and a daily average of 90,679 bbls. for the four weeks ended September 25.

	Week Ended Sept. 25	Week Ended Sept. 18
At Atlantic Coast Ports—		
Baltimore	.....	124,000
Boston	144,000	.....
New York	355,000	337,000
Philadelphia	234,000	145,000
Others	95,000	.....
Total	828,000	606,000
Daily average	118,286	86,571
Total Atlantic & Gulf Coast Ports	828,000	606,000
Daily average	118,286	86,571
Daily avr. 4 weeks	90,679	83,179

Distribution of total California oil receipts is as follows:

Crude	74,000	48,000
Gasoline	384,000	154,000
Gas Oil	.....	135,000
Fuel Oil	370,000	234,000
Total	828,000	606,000

CAPTAIN FLANAGAN HONORED

NEW YORK, Oct. 4.—Capt. James W. Flanagan, president of the Andian National Corp., which recently built a pipe line in Colombia, has been notified that he has been made a Knight of St. Gregory the Great by Pope Pius XI.

–Put them anywhere–

Watts-Miller Gas Engine Driven Air Compressor Units have brought from many groups of wells an increase in production as high as 1000%. These Units have special features which enable them to run by themselves. The pumper pays them a visit at twelve-hour intervals only.

One concern has installed fifty-three Watts-Miller Units in this service, over a period of sixteen years, and they are so equipped that one pumper can and does handle several plants on twenty-four-hour operation.

We shall be glad to explain the many Watts-Miller special features to anyone interested in them.

The Miller Improved Gas Engine Company
Springfield, Ohio

WATTS-MILLER

PLYMOUTH OIL-WELL CORDAGE

More footage per dollar with PLYMOUTH DRILLING CABLE

The enemy of drilling cable is Abrasive Surface wear. Plymouth Manila Drilling Cable meets this condition with quality manufacture which permits no "high spots" to wear at the expense of the entire line. A straight, clean line absolutely uniform in tension and laying, wear - resistant dirt-resistant, water-resistant. The kind of line that the driller appreciates and that the contractor reorders.

Plymouth Oil Well Cordage is ready for immediate delivery on the job at any store of the Oil Well Supply Co.

MANILA Drilling Cable, Bull Rope, Sand Line, Torpedo Line, Crackers.

PLYMOUTH CORDAGE COMPANY
NORTH PLYMOUTH, MASS.
OIL WELL SUPPLY COMPANY
Distributors Stores in All Oil Fields

PLYMOUTH TRADE MARK 1824

LOUISIANA WILDCATS

(Continued from Page 49)

for Superior Oil Co.'s No. 1 Cordell, SW cor. NW NW, Section 5-18-13. Tharpe and associates' No. 1 Peck, Section 22-18-13, is drilling at 1,000 feet. Wingfield and associates' No. 1 McGough, Section 22-17-13, is coring sandy lime at 2,598 feet.

Bradley County

Location was staked for Arkansas Fuel Oil Co.'s No. 1 Arkansas Timber, 200 feet north and west C Section 25-16-12. Magnolia company's No. 1 Arkansas Timber, Section 33-15-11, was dry without a show at 2,707 feet and is drilling ahead in limey shale at 2,808 feet. McMurry and associates' No. 1 Southern, Section 7-15-11, is being washed to the bottom at 3,205 feet. Wingfield and associates' No. 1 Southern Lumber, Section 2-16-12, is drilling shale at 2,930 feet. Phillips Petroleum Co.'s No. 1 Southern Lumber, Section 36-16-11, is fishing for the drill stem at 1,620 feet.

Calhoun County

Delmar Oil Co.'s No. 1 Guidor, Section 16-11-14, topped the red bed at 2,772 feet and is drilling in that formation at 2,802 feet.

Hempstead County

Burton and associates' No. 1 Garland, Section 23-10-25, which has been shut down more than five months, started up last week and was forced into another delay when the drill stem was lost at 2,210 feet. The drill stem is being sidetracked at 2,269 feet at Frank S. Myers' No. 2 Nichols, Section 17-11-25w.

Jefferson County

Decem Oil Co.'s No. 1 Hinsley, Section 7-3-10, is drilling at 2,556 feet.

Lafayette County

Six-inch casing was cemented at 2,786 feet at Arkansas Fuel Oil Co.'s No. 5 Allen, Section 18-19-24. The plug at 2,806 feet was drilled and Kensaw Petroleum Co.'s No. 3, Section 3-20-24, is being bailed to test.

Bienville Parish

Woodley & Collins' No. 1 Thomas, Section 23-16-10, is drilling at 2,180 feet.

Bossier Parish

Doern and associates' No. 1 Bollinger, Section 9-22-11, is a hole full of water at 2,684 feet and is being bailed. Woodley & Collins' No. 1 Roberson, Section 22-23-12, is a rig.

Caldwell Parish

Southern C. O. P. Co.'s No. 4 Caldwell, Section 20-13-6e, was dry and abandoned at 603 feet. Wright and associates' No. 1 Love, Section 16-11-2e, shut down months ago, was abandoned at 1,625 feet. Kinsey & Jones' No. 1 Shaw, Section 22-14-4e, is rigging. Roxana Petroleum Corp.'s No. 1 Louisiana Central, Section 22-12-3e, is drilling water sand at 1,261 feet.

Claiborne Parish

Gilliland Oil Co. and Ramsey's No. 1-D Taylor, Section 14-23-8, had red shale at 4,631-35 feet and cored sandy lime at 4,642 feet. Ohio Oil Co. has staked a location for No. 9 Milner, 925 feet south and 330 feet east, NW cor. SE, Section 22-23-8. George T. Shaw & Ruch's No. 1 King, Section 20-21-8, is drilling at 2,100 feet.

DeSoto Parish

Dixie Oil Co.'s No. 1 Jenkins, Section 9-12-11, is shut down at 4,863 feet waiting for 4½-inch casing. Helm & Jarman's No. 1 Joyner, Section 28-11-12, spudded and shut down. Arrangements are being made to abandon Magnolia Petroleum Co.'s No. 1 Bond, Section 27-12-11, at 4,135 feet. Snapp and associates' No. 1 Flores, Section 27-11-11, is drilling rock at 2,720 feet. The Texas Company's No. 11-A Wemple, Section 2-12-12, is being rigged.

East Carroll Parish

T. A. Snell's No. 1 Garden Home Co., Section 34-20-12e, is drilling at 900 feet.

Franklin Parish

R. W. Williams and associates' No. 1 Lemon, Section 17-14-8e, is being rigged.

Grant Parish

E. H. Billeaud's No. 1 Ball, Section 19-7-1e, started up and drilled 100 feet and was shut down for fuel. Gulf company's No. 2 L. C. Swope, Section 17-9-1e, is being bailed at 1,604 feet with lots of salt water showing and lit le oil. Holmes and associates' No. 3 Holmes, NW NE SE, Section 17-9-1e, is a derrick and No. 1-A Holmes, SE SW SE, Section 17-9-1e, is a derrick pattern. H. L. Hunt's No. 1 Matthews, Section 15-9-1e, is being bailed to test at 1,550-54 feet. Keene & Woolf's No. 1 P. Rider, Section 16-9-1e, cored salt water sand showing oil at 1,553 feet. Tunica Petroleum Co.'s No. 9 L. & A., Section 3-8-2w, is a derrick.

Jackson Parish

Charles A. Ferguson's No. 1 Martin, Section 5-15-1e, is drilling shale and gumbo at 2,850 feet. El Dorado Chief Oil Co.'s No. 1 Jones, Section 3-14-4w, is drilling shale and boulders at 2,390 feet. Grigsby & Co.'s No. 1 Adams, Section 22-17-4w, is drilling gumbo at 2,200 feet. Louisiana Petroleum Corp.'s No. 2 Davis Theus, Section 12-16-3w, is being rigged.

Lincoln Parish

Buckley & Palmer's No. 1 Davis, Section 12-20-3w, is drilling sand rock at 2,555 feet.

Natchitoches Parish

Ohio Oil Co.'s No. 1 L. L. L. L. Co., Section 20-8-8w, was dry and abandoned at 2,095 feet. Brothers and associates' No. 1 Cockfield, Section 78-7-5w, is drilling gray sand at 1,855 feet. Davison and associates' No. 1 L. L. L. L. Co., Section 21-7-8, topped the Wilcox at 886 feet and is drilling hard rock at 1,045 feet. Forrest, trustee, No. 2 Ayers, Section 3-13-7, is drilling at 1,900 feet. Gulf company's No. 1-A L. L. L. L. Co., Section 39-7-7, is drilling gumbo at 1,140 feet. Clem Clarke's No. 1 Prudhome, Section 96-8-6w, is being rigged. Humble Oil & Refining Co.'s No. 1 Noma Roge, Section 85-7-6, is drilling at 1,960 feet. McCormick and associates' No. 1 Russell, Section 41-10-7, is being cored at 1,703 feet. A derrick is being built for Ohio Oil Co.'s No. 2 L. L. L. L. Co., 330 feet north and east center Section 20-8-8w. E. Self's No. 1 Fisher, Section 18-8-9w, is shut down in shale at 1,615 feet. Arrangements are being made to abandon Weaver Brothers' No. 1 fee, Section 4-7-7, at 2,420 feet.

Rapides Parish

Hincey & Macke's No. 1 Barrow, Section 29-5-2e, is drilling at 2,350 feet. Love and associates' No. 1 Voda, Section 12-4-1e, is drilling at 1,200 feet. Sein and associates' No. 1 Ball, Section 41-4n-2w, is shut down at 2,027 feet for orders.

Red River Parish

Alden Oil Co.'s No. 1 Powell, Section 13-11-10, tested salt water in sand at 1,190-97 feet and is shut down for orders.

Richland Parish

Ten-inch casing was cemented at 471 feet at Gulf company's No. 1 England, Section 32-17-6e. Gulf company's No. 1 Ches-Wyman, Section 23-18-8e, is drilling gumbo at 2,460 feet. Roxana Petroleum Corp.'s No. 1 Tensas Delta, Section 3-14-5e, is drilling sandy shale at 1,376 feet.

Sabine Parish

L. M. Emlet's No. 5 H. L. Bowman, Section 9-7-12, is being bailed to test at 4,070 feet. Magnolia Petroleum Co.'s No. 1 L. L. L. L. Co., Section 11-6-11, is drilling gray sand at 1,616 feet.

Winn Parish

Allen Drilling Co.'s No. 1 Sanders, Section 21-13-2w, is drilling at 1,415 feet. A derrick is up for Dodge & Cordell's No. 1 Tremont, SW NW SW, Section 35-13-3w. Humble company's No. 15 A L. & A., Section 28-9-3w, formerly Dodge and others' No. 2 Edenborn, 330 feet north and east center Section 28-9-3w, is a rig. J. C. Long's No. 1 Milam, Section 28-13-3w, is drilling at 100 feet. Ohio Oil Co.'s No. 2 Edenborn, Section 4-12-1w, is shut down at 2,414 feet for fuel.

LaSalle Parish

Tunica Petroleum Co.'s No. 12-A L. & A., Section 17-7-3e, is drilling at 1,558 feet. Tunica company's No. 13-A L. & A., Section 25-8-1e, is drilling at 305 feet.

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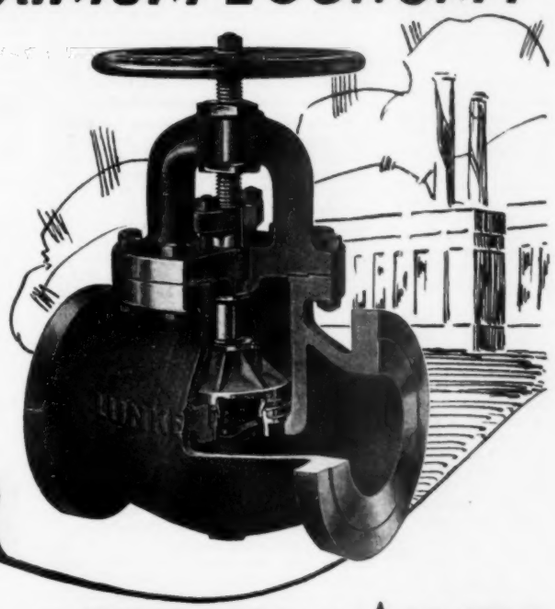

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Lunkenheimer Distributors are located in all commercial centers, and render prompt service right from stock. Call on them when in need of Valves, Boiler Mountings and other Engineering Appliances.

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Pipelines and Crude Oil Purchasing

Producer Runs His Oil to Lease Tanks, Where Buyer Measures It and Makes It Part of a Tender Shipment

By L. M. Fanning

When a producer drills a well which strikes oil, he is immediately concerned as to the quality of the oil and as to the market for the oil. The crude must be free from impurities—"merchantable" oil acceptable for shipment by pipeline. Moreover, the quality of the oil is the determining price factor.

In general, crude oil is purchased in two ways. It is bought by big purchasing companies at "open market" prices which are announced or "posted" by such companies. These companies in turn either store or sell the oil to refiners after arranging for its transportation by pipeline. The other way is purchasing direct from the producer by the refiner, either for current needs at the established posted prices or for long-term requirements by contract. Frequently, the refiner offers premiums over the posted price.

The usual practice is for the producer, after bringing in his well, to get in touch with the local representative of a purchasing company and to ascertain whether it is in the market to buy the oil. If it is, he communicates with a pipeline company and asks if it will lay a line to his well. This well may necessitate laying a line less than a mile long or sometimes for distances greater than 30 miles. If the pipeline company feels that the well or wells to be drilled justifies the investment, it connects up the property.

The producer runs his oil from the well to his settling tanks—these tanks are located on the lease and usually have a capacity of from 250 to 500 bbls.—and the purchasing company then buys the oil at the posted price. The oil is sent to the pipeline company as part of the purchasing company's tender of shipment to its customers. In most cases the pipeline company has nothing to do with the purchase of the oil, and is only responsible for it while carrying it and delivering it to its destination.

Gathering Lines

The short line built to a lease is called a "gathering line." Gathering lines are usually 2, 3 or 4-inch in diameter and run from the lease to the lateral or main trunk pipelines. Lateral lines are 4, 6 or 8-inch and main lines 8, 10 or 12-inch in diameter.

Briefly, gathering service consists of gathering the oil from the producer's tanks at the well and transporting it by gravity or propulsion to trunk line stations. It also includes the measuring of the oil, which, in turn, includes the measuring and strapping of the tanks and the computation of their capacity. A gathering charge is made, which is usually a flat charge, and does not involve the distance which the oil must traverse between well and trunk line station. Gathering charges sometimes vary according to the pipeline company.

The procedure just outlined applies in the case of a producer without transportation or refinery affiliations. Some companies embrace the complete cycle of petroleum activity, engaging in producing, transporting, refining and marketing. Pipeline operations, however, are, as a rule, handled by separate companies acting solely as carriers, and a large company with its own production pays the fixed transportation charge to the pipeline company in having the oil delivered to its refinery. A good many refineries located in producing areas have pipelines which function as an integral part of the company's operation. Some pipelines exercise the function of purchaser and seller.

The pipeline companies stipulate that oil tendered must be free from water or other foreign or injurious substances. Some of the schedules requiring that the oil be a "good, merchantable oil" also stipulate the gravity. Rules adopted by the Railroad Commission of Texas stipulate that by the term "marketable oil" is meant any crude petroleum adapted for refining or fuel purposes, properly settled and containing not more than 2 per cent basic sediment, water, or other impurities above a point 6 inches below the pipeline connection with the tank.

Conditions of Transportation

Crude petroleum is accepted for transportation in some cases on the further condition that it shall be subject to such changes in quality while in transit as may result from the mixture of it with other petroleum in pipelines and tanks of the carrier. Pipeline companies do not deliver to the consignee the identical oil shipped. They stipulate that they are under no obligation to make delivery of the same oil which may be received; but all oils received for shipment are to be delivered out of the common stock of oil at the delivery station.

Oil losses normally occur during transportation especially as a result of "shrinkage and evaporation," and the companies contract, therefore, to deliver only 97 to 99 per cent of the crude oil shipped.

Consignees of crude oil must have sufficient storage facilities to receive the shipment promptly when it reaches its destination. Pipeline transportation rates are established and placed on file with the Interstate Commerce Commission.

The purchasing company pays the producer cash for the latter's oil, it being customary in some cases to mail checks twice a month. Typical large purchasing companies are the Prairie Oil & Gas Co. and the Sinclair Crude Oil Purchasing Co. These companies do not operate pipelines, but they have huge storage facilities. For their services in handling the oil they charge their customers—the refiners—10 cents a barrel, usually referred to as the marketing charge.

When a sale is made by a purchasing company, it makes a tender of shipment to the pipeline company on its particular tariff covering the movement to destination, and when the oil is received at destination the purchasing company is paid for it. No oil is transported for the account of the purchasing company and then sold. The ultimate purchaser—that is, the refiner buying his oil through a purchasing company—pays the posted price for the oil, plus the gathering charge, plus the freight, plus the marketing charge.

Direct Purchasing

Direct or virtually direct purchasing by major refining companies notably the Standard Oil companies, is a recent pronounced tendency.

Probably the only so-called long-term contracts for American crude oil running into large quantity are those concluded by eastern refiners for California crude. Heavy purchases of California oil were made possible in 1922 and 1923 by the big overproduction of oil in that state. These contracts are for quantities which involved deliveries running from one to possibly not in excess of three years. As a rule, the price is on a current market basis—that is, fluctuating with current prices of crude oil or refined products. When a large production is developed in a new pool by a single company, it is not usual for the large purchasing companies to contract for a stipulated quantity, involving regular stipulated deliveries at a flat price holding for the indefinite term of the contract.

A Spot Business

Generally speaking, however, the crude oil business is a spot business, operating on a day-to-day basis. The large refiner buying through a purchasing company does not contract for the purchase of crule. It buys in quantities of, say, from 100,000 to 200,000 bbls., stipulating the kind of oil it wants and agreeing to pay the posted price obtaining at the time the order is placed. It actually pays for the oil when it is delivered.

An exception to the rule of spot crude oil marketing is California. The production of crude oil in that state is largely concentrated among several large companies. What oil these companies do not produce is largely purchased by them. Under the system of purchase and sale of crude petroleum in California, practically all crude is purchased on contract.

The only noteworthy instance of cooperative selling in the crude oil business is the Independent Oil Producers' Agency, the members of which are confined to producers operating in several California fields. This was organized in 1904. Each member is required to own stock in the organization and is limited to one share. After organization, the agency combined with another similar agency operating in one of the California fields. In 1909 the agency entered into a contract with the Union Oil Co. of California whereby the latter was to build a pipeline and become exclusive sales agent for all the crude oil marketed, except that used for the manufacture of asphaltum. This contract has been changed several times since.

A system peculiar to California, although somewhat similarly practiced in the Mexican oil fields, is that of exchanging crude petroleum of the same or different qualities. This is prevalent among the large marketing and producing companies. One company will exchange with another company as a means of economy in transportation.

Quality of Oil

Quality of crude oil has in recent years become an increasing consideration as regards its market and its price. As previously stated, gasoline is the most important product of crude oil. A prominent oil executive describes it as the controlling product from the standpoint of the quantity of crude run, or in other words, the crude is being run to meet the gasoline demand of the country. Therefore, the more gasoline content there is in the crude the more valuable the crude automatically becomes.

As late as 1922 the major purchasing companies in the Mid-Continent Field were putting one price for all Mid-Continent oil, irrespective of its quality. It is true, however, that certain of these companies were paying a premium over the posted price for oil of certain fields having a large gasoline content. Moreover, the practice of premium paying was general among Mid-Continent refiners, particularly those without pipeline facilities, not only as a reflection of their efforts to obtain high-grade oil but as a means for them to obtain small and irregular quantities of the necessary raw material when needed.

Late in 1922 all purchasing companies which had not previously done so discontinued their practice of quoting one price for Mid-Continent oil and adopted scale prices according to the gravity of the oil. Purchasing in practically all fields is now generally done on a gravity basis.

A significant development affecting crude oil values in recent years is the growth of cracking operations in refining, and the establishment of the fact that, generally speaking, cracked gasoline is a superior motor fuel to straight run gasoline. As the cracking of heavy oils is possible and is increasing in practice, it is apparent that their value from the standpoint of gasoline yield will increase and, moreover, as a good many heavy crudes are shown to yield gasoline of special quality—this is, of definite antiknock quality—the differential between high gravity and low gravity crude oil prices may be expected to be reduced.

CREDIT BALANCE SYSTEM STILL IS USED EAST OF THE MISSISSIPPI RIVER

By George Turnbull

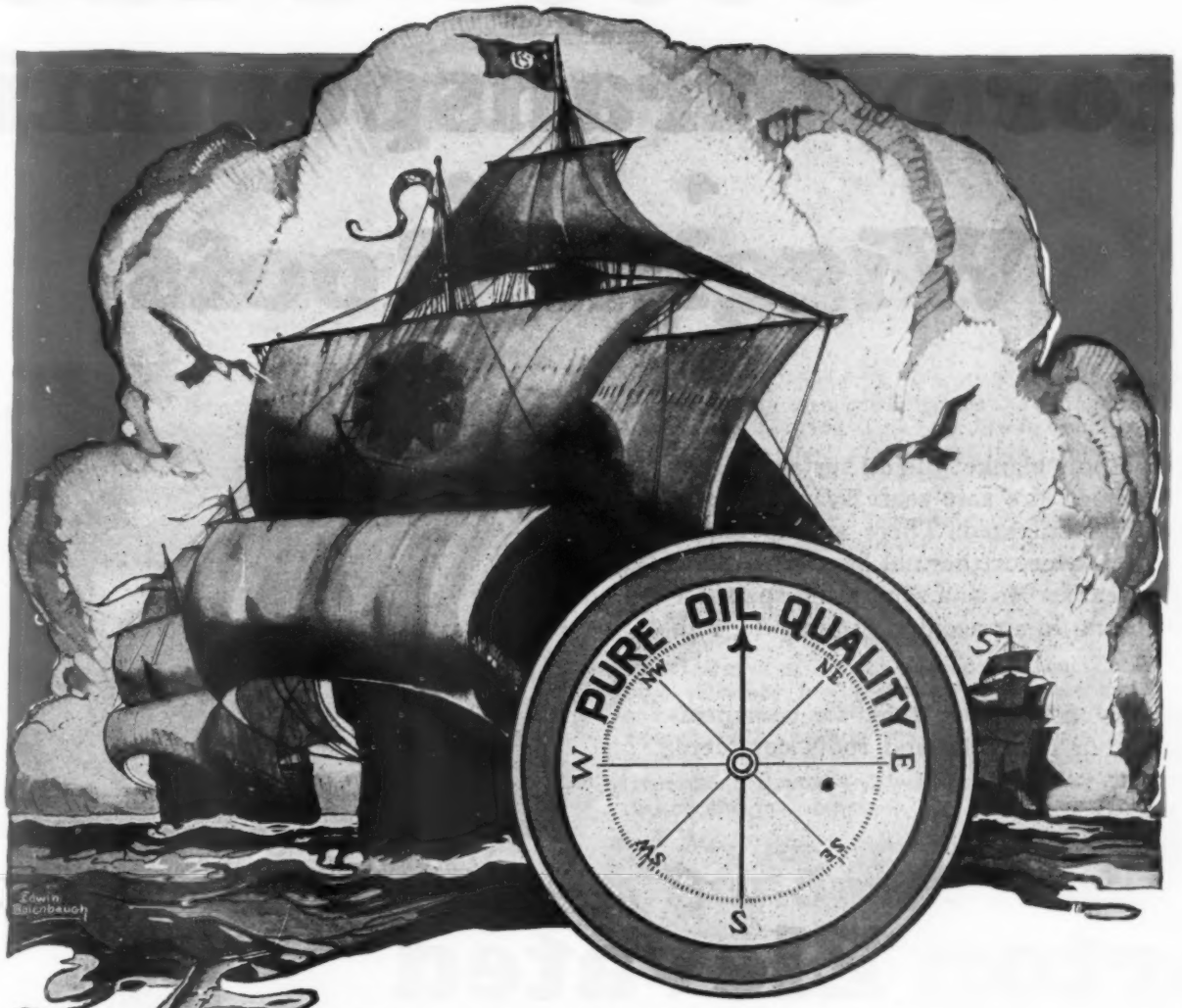
East of the Mississippi River the credit balance system, originated more than half a century ago when the oil industry was in its infancy, is still in use. As a result any person can own crude oil, he does not have to be a producer or a refiner of it, he may simply believe that the price is going to go up and buy credit balance certificates merely as a speculation based on his belief of the price structure. The majority of the pipelines still use the credit balance certificates, but there are a few which use the system where the oil must be sold before it is run. Notably in the latter class in this territory might be mentioned the Tidewater, the Wilburine and the Bessemer.

The first step after the production of the oil is, of course, the gauging. The gauger when asked by the producer to run the oil visits the tank, gauges it, opens the valves that allow the oil to flow into the pipe and then gauges the remainder. He issues a run ticket in triplicate, one part of which is given to the producer, another goes to the pipeline office and the third the gauger keeps. This ticket gives the temperature of the oil and the measurements of each of the two gauges. At the pipeline office the amount of the oil run is calculated and placed to the interests of all those concerned. The amount of production to which the royalty owner is entitled is immediately entered to his credit on the books of the company, as well as that of all the operating owners.

The credit balance system is kept in much the same manner as the business of any bank. The owner of oil when he desires to sell merely asks for his credit balance from the pipeline and when this is furnished writes out an order of sale to whatever concern or individual he desires to sell to.

The credit balance system makes it possible for a producer to run his oil to the pipeline company and then sell whenever he desires to. If he does not like the present market he can allow his credit balance to grow until such a time as he desires to sell, provided of course that he pays the pipeline company its charges for the storage of the oil. A producer does not have to maintain much storage space at his wells in order to store his oil but can have it run to the pipeline tanks.

This system, which is peculiar to the eastern district, also has its effect on the refining and marketing divisions. When the producers feel that the market is favorable and that a price advance is in sight then they start to hold their oil and the result is that the refiners are not able to obtain sufficient oil to operate their plants anywhere near capacity.



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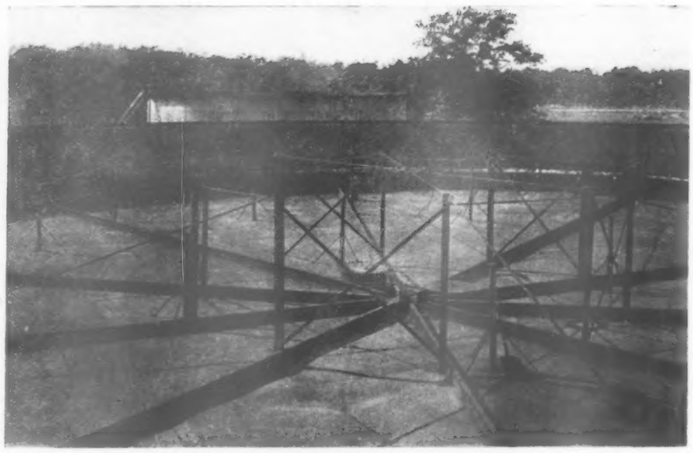
Wiggins Roofs blanket the oil surface with a steel deck and fire safe seal. Evaporation is practically eliminated. There are no losses from splash-over or thermal breathing. The gastight seal serves as a separating space for oil entraining in air accidently pumping into the tank.

Quotations on Wiggins Roofs for your present tanks, or on tanks and roofs complete, on request.



Wiggins Roofs protecting the storage of the Indiana Pipe Line Company at Griffith, Indiana.

Horton Elevated Tanks

Elevated storage in a Horton Tank is the most dependable means of water supply for general service at pipe line pumping stations. Horton elevated tanks with hemispherical or ellipsoidal bottoms are available in a wide range of standard sizes to meet practically any requirements. Literature on request.

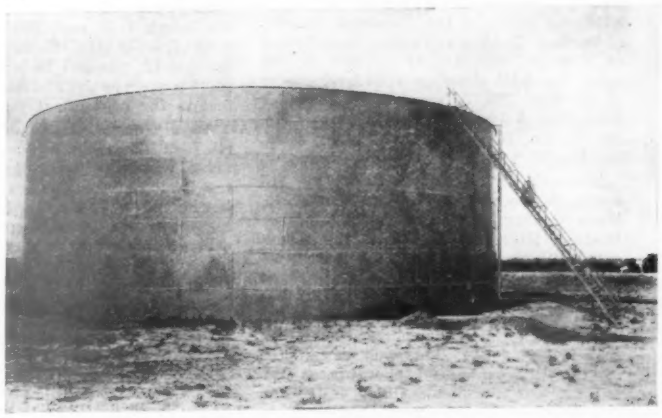
Six crude oil stills built for a western refinery.

Condenser boxes built at Casper, Wyoming, for the Midwest Refining Company.

A 40,000-gallon hemispherical-bottom Horton Tank at the Cozad, Nebraska, station of the Sinclair Pipe Line Company.

WIGGINS ROOF

Construction
—production—refining
Storage Tanks



The Horton 5-Ring 55 is a 55,000-barrel tank of approximately the same height as the 6-ring tank but having one less ring. This tank has fewer horizontal seams, fewer shell plates, less rivets, and can be erected in less time. These same advantages are characteristic of the Horton 7-Ring 80, an 80,000-barrel tank. We recommend large capacity tanks since the cost of grades, fire walls, and piping arrangements, amounting to a considerable sum, does not vary proportionately with the size of the tank, and the cost per barrel capacity with the larger sizes is somewhat smaller.

The features of construction on all our tanks are high efficiency joints, extremely accurate punching and high grade erection work. The large tanks are riveted, with welding roofs and bottoms when so desired. The smaller sizes may be all-welded, all-riveted, or riveted-and-welded, depending on conditions and preference.

Umbrella Roof Tanks

These small gastight storage tanks with self-supporting roofs are of the same rugged construction and have the same care in design and fabrication that is characteristic of the large sizes. Illustrated above are four 3000-bbl. and three 5000-bbl. umbrella roof tanks built for the Great Southern Producing and Refining Company at Ardis, La.

Rundown Tanks

Rundown tanks and other small tanks for refinery storage are built as all-welded, all-riveted, or welded-and-riveted structures. All-welded rundown tanks equipped with Wiggins Roofs have practically no evaporation loss.

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HORTON TANKS

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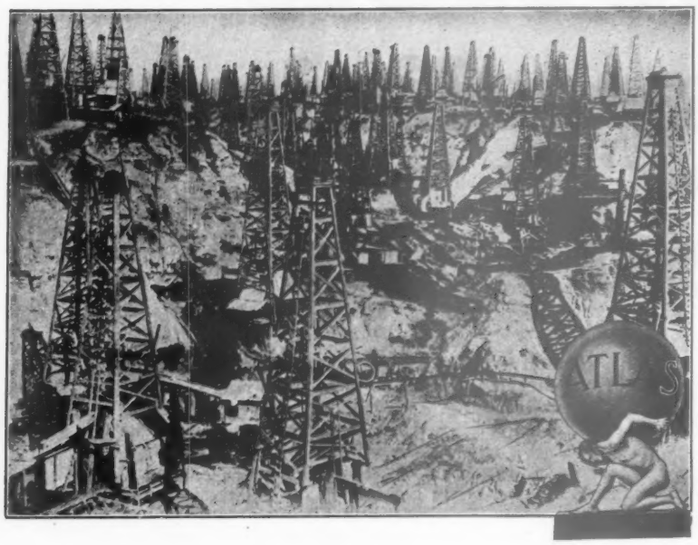

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AFTER the gusher is brought in, the job of gathering liquid dollars calls for pretty steady going. Sturdiness and precision are two qualities which equipment must possess to secure the greatest production per dollar of operating cost. When it comes to Working Barrels, Atlas Valve Balls have a proved record of economy with leading producers in oil fields.

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ATLAS BALLS

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CENTRAL WEST FIELDS

(Continued from Page 65)

tion 2. In the same township, the Wright Oil Co. abandoned Nos. 1 and 2 James Hamilton farm, and Nos. 1 and 2 Clayton Severns farm, all in Section 26. Most of the abandoned wells of M. P. Colt will go into the Perrysburg Field, of Wood County, where the Ohio Oil & Gas Co., of which Mr. Colt is president, will do a lot of drilling.

Indiana

One of the best of the late completions in Indiana was made by Claud Chandler and others at a test in the northeast corner of the Mandy Williams farm, in the northeast quarter of Section 14, Logan Township, Pike County, which is credited with a production of 81 bbls., the first 24 hours. This is in the Miley Pool, where some large wells have been found in the past, and makes a slight extension to the rich pool. Top of sand was found at 1,367 feet and drilled 41 feet in the sand. No. 2 is being started. The Consolidated Oil Development Co.'s No. 4, in the southwest corner of the C. Atkinson farm, in the northeast quarter of Section 22, same township, topped sand at 958 feet and drilled 41 feet in the sand, the well showing a 24-hour gauge of 20 bbls. No. 5, same lease, is under way. The Noble-Bolyard Oil Co. is starting its No. 10 on the D. S. Huey farm, Section 27.

The wildcat well on the Ballentine 515 acres, Section 20, Decker Township, Knox County, on the south bank of the Wabash River, southeast of the Allendale, Illinois, Field, was drilled to a total depth of 2,204 feet and dry. There was a slight showing of oil at 2,185 feet and Blue Lick water encountered at 2,200 feet. It is being plugged and will then be abandoned. This well was started by the well-known oil operator, A. H. Russell, of Cleveland, Ohio, and when the depth of the Wabash County Field was reached and no oil was found, the Eastern Gulf Oil Corp. took over the test and finished to the depths given. Several wells have been drilled in Decker Township, with hopes of extending the Allendale Field of Illinois, across the Wabash River into Indiana, but so far all have failed to show real commercial production.

In Turman Township, Sullivan County, Dugger parties are working at No. 4 on the J. T. Carrithers farm, Section 30. In Fairbanks Township, A. R. Morris started a test on the John Hunt farm, Section 6. The Ohio Oil Co. is drilling No. 22 on the J. V. Merrill farm, Section 35, and Hollingsworth and others are drilling No. 5 J. F. Harrison farm, same section.

Eastern Indiana

In the old Trenton Rock area of eastern Indiana, in Salamonie Township, Huntington County, Wood & Canaday brought in a 20-bbl. producer in No. 7 on the W. D. Bonifield farm, Section 19. The March Petroleum Co. is drilling No. 11 on the J. L. Priddy farm, Section 20. The late wells drilled in this area, have proven quite productive for old-time territory and is an incentive for further test work.

Adams County at this time takes the lead in the old field as there are close to 20 strings of tools working. The only completion reported for the week was a dry hole drilled by the Chicago Oil Co., in No. 3 on the Armstrong heirs' farm, Section 35, Wabash Township.

Near Montpelier, in Harrison Township, Blackford County, the Montpelier Development Co.'s No. 3, on the A. F. Gerard farm, Section 1, is reported a duster.

In Penn Township, Jay County, Claud Thompson drilled in a dry hole at a test on the Sarah J. Bourne farm, Section 18, and the Amber Oil Producing Co. is drilling No. 11 on the S. E. Davis farm, Section 21. In Bear Creek Township, same county, N. T. Smith and others' No. 4 Irwin Campbell farm, Section 15, is a 10-bbl. pumper. The Central West Oil & Gas Co. is drilling No. 3 on the L. D., G. F. and L. E. Bone farm, Section 10.

Illinois

The Allendale Field of Wabash County was the active spot of Illinois during the week, with at least four excellent producers brought in. In Wabash Township, Joe S. Young, Jr., and others' Nos. 2 and 3, on the Joe Keyser farm, in the NW SW, Section 6, are reported with an initial production of 125 bbls. each. No. 2 struck top of sand at 1,447 feet and drilled 9 feet in the sand. This lease adjoins the Gher farm, where a short time ago a good well was finished that brought about the present activity closer to the Wabash River than was formerly the case in the Allendale Field. Mayhugh and others' No. 9, in the southeast corner of the Kogan heirs' farm, Section 2, is a 60-bbl. producer. Top of sand at 1,393 feet and drilled 15 feet in, while the Breen Oil Co.'s No. 13, 600 feet from the south line and 200 feet from the east line of the Breen farm, in the northeast quarter of the same section, is a 60-bbl. producer, with sand topped at 1,415 feet and drilled 9 feet in the sand. Ellison and others' No. 4, 200 feet from the south line and 850 feet from the west line of the Collison heirs' farm, Section 12, pumped 10 bbls. Sand struck in this well at 1,420 feet and drilled 17 feet in the sand.

Word comes from Gards Point, in Prairie Lick Township, Wabash County, that actual drilling operations began on the test well on the Charles S. Groff farm, in the SE NW, Section 31, which is being drilled by Miller, Lengelson and others in the northeast corner of the farm. The test recently completed by the same parties on the Crump lease, just to the north of the present drilling well proved to be a dry hole, but it is hoped by the natives that the present test may prove more successful.

George Whitson and others are delayed by a fishing job at their test on the V. E. Tanguary farm, Section 31, Wabash Township, Wabash County, and near the village of Orio. This well was almost due for completion when the fishing job came. Two more rigs are being moved in for wells to the northeast of the Banks and Johnson lease, near the Wabash River. One is on the Mrs. Morgan farm and the other on Walter Parkinson farm. In the same vicinity, No. 4 has been started by Joe S. Young, Jr., and others on the Joe Keiser lease. Hughes and others have a rig in on the Armstrong least, southeast of the Keyser. Young, Leighty and others started the drill at a test on the Ogle Johnson farm, and are also drilling a well on the Gher 25 acres. Adams Corner Oil Co.'s No. 9 on the Max Madden farm is due in the sand.

Other Illinois Wells

In Centralia Township, Marion County, the Ohio Oil Co.'s test in the southwest corner of the H. W. Adams farm, Section 3, is a 5-bbl. pumper. This well was drilled to a total depth of 1,738 feet, then plugged back to the pay at 1,624 feet.

The Block Oil Corp, drilled a dry hole in a test 1,520 feet from the south line and 2,340 from the west line of the Earl Thrakill farm, Section 25, Charleston Township, Coles County.

In Grandville Township, Jasper County, Wimsett and others' test on the Ella Decker farm, Section 17, was a dry hole at 872 feet.

In Parker Township, Clark County, the Ohio Oil Co.'s No. 120 on the N. and K. Young farm, at Oil Fields, Section 17, pumped but 1 bbl. of oil at 500 feet. In Caney Township, the same company's No. 7 J. Y. Smith farm, Section 23, pumped 2 bbls. at 1,447 feet, while W. C. McBride, Inc., drilled a dry hole in No. 25 on the James Rush farm, Section 26. In Martinsville Township, same county, John T. Smith and others' No. 4 on the T. J. Ramsey farm, Section 31, pumped 40 bbls. the first 24 hours' pumping, at 1,601 feet. Ferriman and others are drilling No. 3 W. D. Slater farm, same section, and the Ohio Oil Co. is drilling No. 6 on the A. W. Cavolt farm, same section. The W. C. McBride, Inc., is

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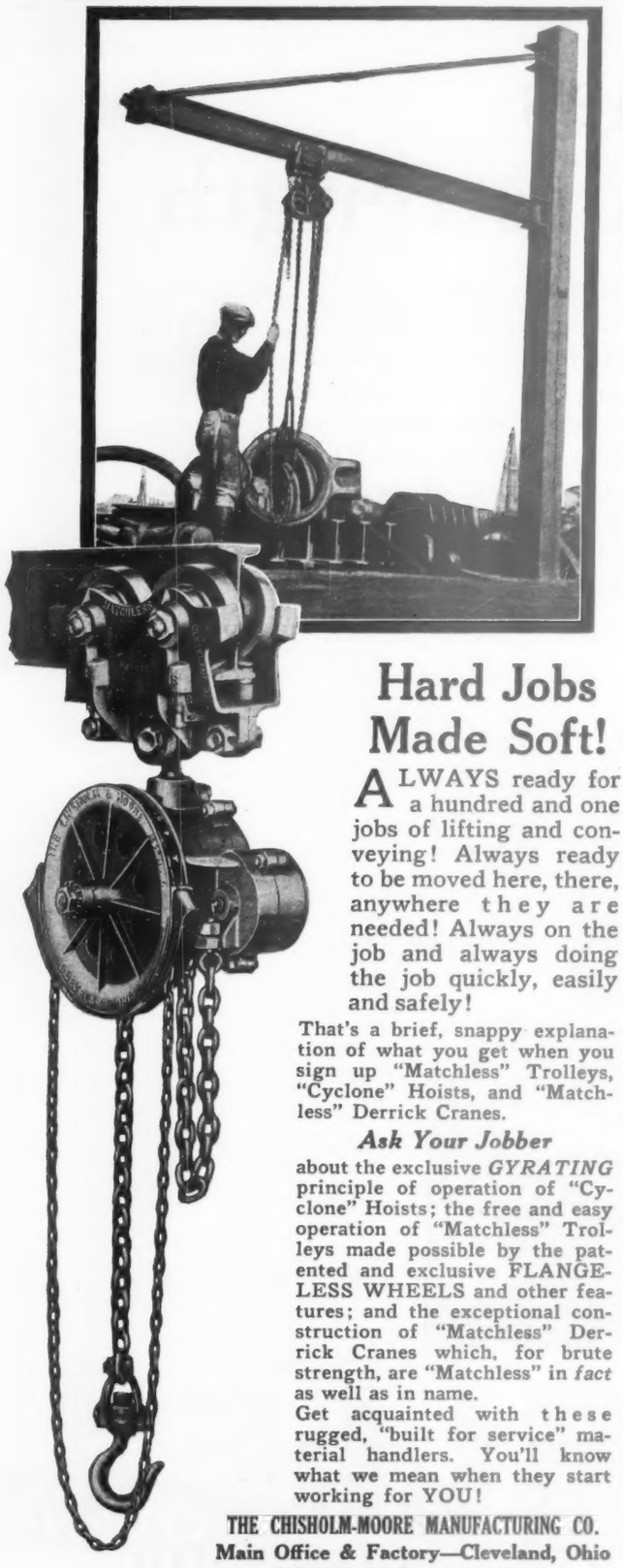

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about the exclusive *GYRATING* principle of operation of "Cyclone" Hoists; the free and easy operation of "Matchless" Trolleys made possible by the patented and exclusive FLANGELESS WHEELS and other features; and the exceptional construction of "Matchless" Derrick Cranes which, for brute strength, are "Matchless" in *fact* as well as in name.

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drilling a test on the Alex Beasley farm, Section 6, Orange Township, same county.

Central Ohio

The feature of the Central Ohio Field the past few days is the completion by the Logan Gas Co. of a 150-bbl. initial production in its No. 3 well, 583 feet east of No. 2 and 300 feet from the north line of the E. R. and O. M. Van Winkle 165 acres, Section 18, Perry Township, Coshocton County. This new area is destined to become more active in the near future, for when wells like those on the Mossholder and Van Winkle farms are found it means much for any section of the deep sands.

The test of Dillion and McFrederick Brothers, 800 feet from the south line and 300 feet from the east line of the S. M. Spedy 26 acres, in the southeast quarter of Lot 58, Strongville Township, Cuyahoga County, is listed as a dry hole.

In Monroe Township, Holmes County, the Pure Oil Co.'s test in the southwest corner of the Gladys R. Purdy 81 acres, Lot 23, is estimated at 30 bbls. initial production. In Hardy Township, same county, the Empire Gas & Fuel Co.'s No. 1, in the northwest corner of the Mary A. Findlay 79 acres, Lot 15, proved a duster.

The Ohio Fuel Gas Co. drilled an average gas well in the southeast corner of the Lowery Johnson farm, Section 33, Congress Township, Wayne County. In Wooster Township, the Ohio Oil Co. is drilling a test 600 feet from the south line and 1,000 from the east line of the Albert Berger 145 acres, Section 29. Same company is drilling No. 3 in the northeast corner of the Olive M. Smithisler 37 acres, Lot 7, Monroe Township, Holmes County. East Ohio Gas Co. is drilling No. 4 well, 300 feet from the north line and 865 from the east line of the L. A. Sowash 40 acres, Section 17, Prairie Township, same county. Same company is drilling a test in the northwest corner of the Alfred and Ella Mohr 30 acres, Lot 19, Kilbuck Township, same county.

Michigan

There appears to be quite a rush of the drill in the Saginaw Field at this time, and work will continue in a brisk manner until the heavy snow fall, is the prediction of those on the ground. The production runs close to 450 bbls. daily, and there is a ready market for the product, for as fast as a producing well is brought in and put on the pump connections are made by the Sun Oil Co., which has a gathering system over almost the entire field. This company has completed its 2,500-bbl. storage tank along the Pere Marquette Railroad, which runs through the center of the productive field. The oil is shipped by the Sun company in tank cars to its refinery at Toledo, Ohio. Pennsylvania prices are reported paid for the oil, less running charges.

The well of John H. Shaltry and others on the Reinhart farm, in defined limits, has not yet been put on the pump, and when the tools were run in the hole it is reported there was about 1,650 feet of crude in the well, and it should make an average well for the field. A leaky boiler has delayed work.

Another well reported making a good showing is that of the Sun Oil Co.'s No. 1 on the Dr. D. E. Bradshaw farm, on the Bay Road, about one-half mile north of the Shattuck Road and nearly half a mile northwest of the Ohio Fuel Corp.'s well on the Fisher farm, and in the northeast quarter of Section 10, Saginaw Township. Top of the Berea sand was found at 1,836 feet and drilled about 15 feet in the sand. This well is an extension northwest of any producing well in the field, although not the farthest west well, as the well of the Bliss Petroleum Co., on the Fred Engle farm, is about a half mile south and half a mile further west than the Bradshaw well. Still, it adds a large scope of fairly good looking territory to the northwest of the field proper. The Bradshaw well shows a 6-foot dip from the Ohio Fuel Corp.'s well on the Fisher farm, although a level may show less and ground levels appear to be lower. The production of the well will not be known until cleaned out and put on the pump. It has been estimated showing for 12 bbls. or better, and the Rinehart well of John Shaltry and others is estimated at 15 bbls.

The well of the Fordney Petroleum Co. on the Joseph Bisner lease, on North Charles Street near Weiss Street, is due for completion almost any time, being close to the sand depth of the field. The second well of the Saginaw Prospecting Co., on the Waterworks Park Addition, is also near pay sand. This well set a string of 1,600 feet of casing to shut off any possible flow of water, which is usually found at the 1,500-foot depth in that vicinity.

The Saginaw Prospecting Co. has started a test on the Hemmeter lease on the Brockaway Road, and has also started its test on the E. G. Rust farm, Section 9, Buena Vista Township, on the North Washington Road to Bay City and a mile east of Saginaw City.

October, according to reports, should see at least 15 or 20 completions in the Saginaw Field, as the aim of the operators is to show a 1,000-bbl. a day production by the close of the month. Leasing continues over the field, all small lots or acreage being gobbled up, so say nothing of the great number of leases being taken in all parts of Saginaw County, as well as in Bay, Midland and Alcona Counties. It took a long time for Michigan to get into the oil producing business, and it will be safe to say that before the Saginaw Field was opened no more than 200 wells had been drilled over the State.

The Local Petroleum Co., with a capital of $25,000, has been organized in Saginaw, and work has started on a well on the Graham and Sparkling lots, on Oakly Street, between Pleasant and Reed Street, the incorporators being Harry R. Graham, Dugald E. Wilson and James M. Sparling.

Valley Oil & Gas Co. has started a second well on the Charles Priess lease, near Michigan Avenue and Madison Street. The Sun company has started No. 2 on the J. W. Weiss farm, Section 11 Saginaw Township, and S. R. Dietrick and others started a well on property on the Hermansau Road, north of the Pere Marquette Railroad.

The Kipp Oil Co. is a new Saginaw organization, with Albert Kipp, president; Fred Vogt, vice president; Ferdinand Martin, secretary, and Louis Stobel, treasurer.

NON-SHATTERABLE GOGGLES

SHREVEPORT, La., Oct. 2.—Because of recent serious accidents caused by flying gravel striking motorists in the eyes while driving on Louisiana gravel highways, Standard Oil Co. of Louisiana is equipping employes who travel those highways with non-shatterable glasses. In addition to the non-shatterable glass, the goggles further protect the eyes with a light mesh fastened to the rim of the glasses and which fit snugly on the face.

SEEKS ADDRESS OF HER SON

Mrs. J. F. Bennett of Allegany, N. Y., wishes to learn the address of her son, Al Bennett, who she believes is located in the Mid-Continent oil field. Anyone knowing it is asked to write to Mrs. Bennett.

GARLAND COUNTY, ARKANSAS

H. H. Givan of Hot Springs, Ark., writes that he is drilling a well on the Garrett farm, in the NE SE, Section 1-3-19w, Garland County, Arkansas; that surface casing has been set, and the hole was at a total depth of 230 feet, with crews running tour.

BELGIUM SEEKS SUBSTITUTE

Belgium is reported to be following France in an attempt to obtain alternative fuels. Various Government departments are contemplating the use of alternatives to assist in the stabilization of exchange. It is added that an alcohol-petrol mixture is likely to find favor, and that its cost is claimed to be substantially lower than petrol.

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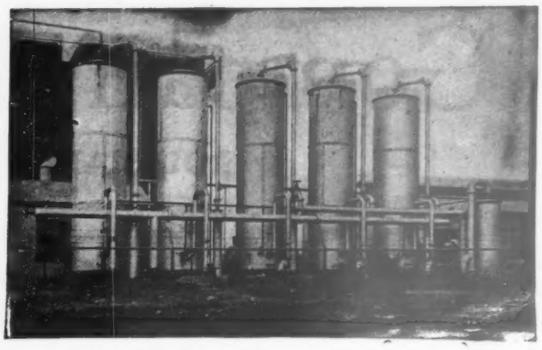

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DEMAND ON PIPE MILLS IS HEAVY; OIL COUNTRY GOODS PRICES FIRM

By B. E. V. Luty

PITTSBURGH, Pa., Oct. 4.—Demand upon the pipe mills is still running quite heavy, despite the lateness of the season. There is little if any decrease in merchant pipe demand in the past week or two, the volume being approximately equal to the average of the past few months.

In oil country goods the slight decrease in buying there has been in the past few weeks has not been sufficient to enable the mills to catch up in deliveries. There has been an improvement in deliveries, but there is still a delay on new business of three or four weeks at least. Mill delivery promises on most sizes of casing, etc., still run four weeks and more, but such promises are likely to be kept, whereas recently the deliveries were in many cases much later than the promises.

There is a moderate amount of small business going in line pipe but it does not seem that there is much big business actually being figured on. Various orders have been placed in the past two or three months without there being much negotiation, and it is possible some business is being quietly placed at the present time. As to the 20-inch gas line from Amarillo, Tex., talked about for so long, it is said that this had not come out in a formal inquiry as yet.

Pipe mill operations continue at above 90 per cent, this being made up of practically full operation of the really available lap weld capacity and 75 or 80 per cent operation of butt weld capacity. Percentage operations are based on considerably larger capacity than formerly and with a rate above 90 per cent for the major part of the year thus far the indication is that a new record in pipe mill output will be made this year by a wide margin, more than 10 per cent and possibly more than 20 per cent. The record year thus far has been 1923.

Merchant pipe and oil country goods prices are very firm all along the line, as they have been for a long time.

The steel trade in general continues to give an exhibition of holding up better than was generally expected by either buyers or sellers. The buying is all of hand to mouth character, except in the case of construction steel, and sellers have had difficulty in realizing that a market of that sort could hold out indefinitely.

The volume of demand for steel in general is best judged by mill operations and there is no indication that there was any decrease in September from the high rate of August, which showed 10 per cent increase in steel production over July. In some quarters it is thought mill operations have run a trifle heavier, on the whole, in the past fortnight than in August. There is no basis for expecting any decrease in the future, except in connection with some seasonal decreases in consumption.

Rail buying for delivery in 1927 is now beginning in volume. Not a great deal of tonnage has been formally entered thus far, but several large roads are figuring on their tonnages. Last year the Pennsylvania Railroad was late in placing its business while this time it is expected to be early. In fact, there is a report that of the 200,000 tons required by the system 40,000 tons has already been placed for the lines west of Pittsburgh. In the past two months there has been a fair amount of rail buying for the remainder of this year, and rail mill operations are holding up better than they usually do at this time of year.

Nearly all the sheet mills have announced price advances on black and galvanized, from 3.00 to 3.10 cents on black and from 3.85 to 3.95 cents on galvanized, on the new 24 gauge basis. In connection with such advances customers are allowed to cover for limited periods at old prices and the trade assumes that by the time the new prices are effective as market minimum deliveries for the remainder of the year will be quite well covered.

Valley pig iron has been stiffening of late, in line with expectations long entertained, Bessemer and foundry both being up 50 cents, the present market being $18.50 to $19 on Bessemer, $17.50 to $18 on basic and $18 on foundry and malleable, f.o.b. valley furnaces.

CONSERVATION FROM WITHIN THE INDUSTRY

In a recent address, quotation from which has been made by Associated Oil Co., Paul Shoup, former head of that company, discussing oil conservation and the possibility of exhaustion of reserves, said:

"Recurrently someone brings up the question of oil upon the ground that, if it is not conserved shortly, within some period of time ranging from seven to one hundred years, we will be without it.

"When the oil is gone, if it ever is—and none of us in our lifetime will be able to answer that question—human intelligence and ingenuity will find substitutes just as it has always found them heretofore.

"Waste is attendant upon all human efforts, but conditions are becoming increasingly better. The oil industry can very propertly claim credit for much greater economic efficiency than a few years ago.

"We ruin fewer fields and wells with water, we lose fewer wells in drilling and we are getting more oil out of the mile-deep reservoirs we are tapping. We are controlling and utilizing gas output very much better than we did formerly. It is along these lines that the industry can promote service.

"If we can reach the point where no two oil wells will be drilled where one will serve, perhaps, or where no two gathering systems will be built when one is enough, or where there will not be a multitude of refineries beyond the needs of the market in any locality, we will have achieved something. These things we must do within the industry."

ENGLAND USES MORE OIL

NEW YORK, Oct. 2.—"Our business is about 15 per cent better than a year ago," said J. W. Frye, sales manager of the Anglo-American Oil Co., on his arrival from Europe. "Oil consumption in England is increasing all the time. This is mainly due to automobiles, which formerly were a luxury and now have become a necessity. The coal strike is holding England up, and only 50 per cent of her wheels of industry are turning. From present indications, this strike may last a month or two more. In spite of the coal strike, things are looking better, and we hope to have a good fall."

SEES GOOD OIL YEAR

NEW YORK, Oct. 2.—"The oil business is in a very healthy condition," said Herbert J. Carr, a director of Anglo-Mexican Petroleum Co., Ltd., on his arrival on the Leviathan. "In my opinion, the prices of gasoline, fuel oil and crude will continue at their present levels, but business will show a largely increased volume. Next year should be a big year in the oil industry. All factors are pointing that way."

ITALY IMPORTS MORE OIL

Italy is gradually increasing her consumption of mineral oil for fuel, the Department of Commerce is advised by Commercial Attache Osborne at Rome. An indication of this growing tendency to displace coal as a fuel is shown by increased imports of crude oil from 210,000 metric quintals in 1924 to 374,000 metric quintals in 1925.

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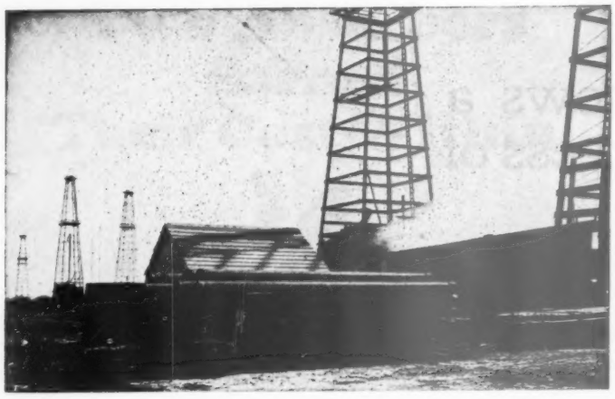

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12 MONTHS ENDING AUG. 31, CRUDE OUTPUT IN U. S. WAS 745,573,905 BBLS.

By James McIntyre

A total of 745,573,905 bbls. of crude oil was produced in the United States in the 12 months ending with August 31 of this year. The production for the 12 months ending December 31, 1925, was 759,846,578. At the rate we are producing at this time it seems quite probable that the production this full calendar year will exceed that of last year.

The production of the United States for 12 months at the close of each month this year shows the following variations:

Production for 12 Months

At close of—	Bbls.
January	759,029,823
February	758,906,060
March	759,684,164
April	757,037,913
May	750,658,312
June	746,096,464
July	744,138,457
August	746,573,905

The production in August, 1926, and in August, 1925, by states is given below:

Production by States

	Aug., 1926	Aug., 1925
California	18,765,080	21,055,580
Oklahoma	14,615,236	14,441,040
Texas	17,073,436	11,936,070
Kansas	3,712,436	3,558,087
Arkansas	4,878,191	7,450,580
Louisiana	2,190,739	1,858,543
Rocky Mountain	3,457,687	3,250,448
Eastern	3,420,000	3,177,000
Total	68,112,805	66,677,357
Daily average	2,197,187	2,150,883

It will be seen from the above that the big excess of production in August, 1926, over that of August, 1925, came from Texas. The total increase in the United States is shown to be 1,435,448 bbls., while the increase in Texas alone was 5,137,366 bbls. The enormous increase in Texas, due mainly to the Panhandle Field and Spindletop deep sand, overbalanced losses in California and Arkansas, where the decrease was greatest in the course of the 12 months, as the table shows. In Oklahoma, Kansas, the Rocky Mountain and the Eastern fields there was not a great deal of difference in the production in August this year as compared with that of the same month last year.

The production of the various producing divisions for the 12 months ending August 31 was as follows:

Production by States

	12 Months Bbls.	Daily Av. Bbls.
California	226,019,280	605,325
Oklahoma	171,162,208	468,935
Texas	141,630,430	388,029
Kansas	40,403,140	110,693
Arkansas	65,778,638	180,216
Louisiana	23,133,025	63,378
Rocky Mountain	38,905,184	106,589
Eastern	38,541,900	105,485
Total	745,573,905	2,042,669

It will be observed that while Texas produced an average of 388,029 bbls. for 12 months, its August production was 550,756 bbls. per day, showing the tremendous influence of Spindletop and Hutchinson and Carson Counties, and the Nigger Creek Field in Limestone County in August. The production of the state jumped from 451,089 bbls. a day in July to 550,756 bbls. a day in August. It passed the 600,000-bbl. mark in September, but that is another story. In August it broke all its past production records.

The following tables show the August production in the five states of Kansas, Oklahoma, Texas, Louisiana and Arkansas:

SUMMARY BY PRODUCING DIVISIONS

Mid-Continent Fields

	Daily Av.	Mo. Av.
Kansas	119,756	3,712,436
Oklahoma	471,556	14,618,236
North Texas	91,854	2,847,474
Central Texas	51,691	1,602,421
West Texas	38,346	1,188,696
Panhandle of Texas	95,908	2,972,148
East Cen. Texas	70,265	2,178,215
Arkansas	157,361	4,878,191
North Louisiana	56,823	1,761,513
Total August	1,153,559	35,760,329
Total July	1,108,381	34,359,811
Difference	45,178	1,300,518

Gulf Coast and Southwest Texas

Gulf Coast (Tex.-La.)	170,549	5,287,019
Southwest Texas	45,990	1,425,690
Total August	216,539	6,712,709
Total July	164,142	5,088,402
Difference	52,397	1,624,307

Production by States

	Daily Av.	Mo. Av.
Kansas	119,756	3,712,436
Oklahoma	471,556	14,618,236
Texas	550,756	17,073,436
Arkansas	157,361	4,878,191
Louisiana	70,669	2,190,739
Total August	1,370,098	42,473,038
Total July	1,272,523	39,448,213
Difference	97,575	3,024,826

KANSAS

Daily Average and Total Monthly Production in August, 1926

Marion County—	Daily Av.	Mo. Av.
Florence	1,203	37,293
Peabody	1,996	61,876
Covert-Sellers	835	25,885
Total	4,034	125,054
Butler County—		
Potwin	438	13,578
Elbing	2,762	85,622
Cameron-Robinson	781	24,211
Wilson-Dunkle	1,660	51,460
Towanda	2,745	85,095
Fox Bush	1,630	50,530
Nuttle-Koogler	2,234	69,254
Eldorado	6,548	202,988
Smock	297	9,207
Leon-Weaver	1,742	54,002
North Augusta	1,635	50,685
South Augusta	1,947	60,357
Sluss	388	12,028
Douglass	133	4,123
Keighly (27 & 28-7)	3,055	94,705
Eastern Butler	1,247	38,657
Total	29,242	906,502
Greenwood-Woodson Counties—		
Sallyards	1,640	50,840
Teeter-Pixley-Scott	19,127	592,937
Virgil	4,454	138,074
Thrall-Burkett	3,701	114,731
Seely	16,084	498,604
Polhamus	2,012	62,372
Miscellaneous	3,301	102,331
Total	50,319	1,559,889
Cowley County—		
Rainbow Bend	3,414	105,834
Slick	1,515	46,965
Graham	1,334	41,354
Rock (Twp. 30-4)	361	11,191
Clark (Twp. 31-5)	321	9,951
Eastman (Twps. 30-6 and 31-6)	864	26,784
Winfield-New Salem (Twps. 32-4 and 32-5)	2,309	71,579
Miscellaneous	475	14,725
Total	10,593	328,383
Other Counties—		
Sumner	3,459	107,229
Rice	1,083	33,573
Russell	4,786	148,366
Harvey	35	1,085
Chautauqua	2,460	76,260
Elk	2,332	72,292
Montgomery	1,886	58,466
Wilson	255	7,905
Allen	1,911	59,241
Neosho	806	24,986
Lyon	2,144	66,464
Miami	455	14,105
Franklin	521	16,461
Douglass	45	1,395
Bourbon	19	589
Linn	241	7,471
Anderson	3,093	95,883
Labette	27	837
Total	25,568	792,608
Total August	119,756	3,712,436
Total July	116,557	3,613,267
Difference	3,199	99,169

OKLAHOMA

Daily Average and Total Monthly Production in August, 1926

	Daily Av.	Mo. Av.
Washington County	5,882	182,342
Nowata County	5,314	164,734
Rogers County	1,759	54,529
Osage and Eastern Kay Counties—		
Burbank	47,273	1,465,463
Osage, outside Burbank	33,869	1,049,939
Total	81,142	2,515,402
Tulsa County—		
Bird Creek, Owasso, Etc.	3,855	119,505
Red Fork, Sand Springs, Bruner, Turkey Mountain and Fisher	3,549	110,019
Bixby, Leonard, Jenks	2,605	80,755
Broken Arrow, Coweta	1,192	36,952
Total	11,201	347,231
Okmulgee, Muskogee and North Okfuskee Counties—		
Mounds, Beggs, Hamilton, Switch, Youngstown	10,866	336,846
Bald Hill and Haskell	5,058	156,798
Morris, Boynton, Cole	3,470	107,570
Okmulgee	2,412	74,772
Tiger Flats, Henryetta, Schulter and Bartlett	3,899	120,869
Total	25,705	796,855
Okfuskee, Seminole and Hughes Counties—		
Deaner-Lyons	4,088	126,728
Wewoka	32,918	1,020,458
Cromwell	76,109	499,379
Pappose-Gilcrease	8,773	271,963
Okemah	153	4,743
Weleetka	1,795	55,645
Wetumka	35	1,085
Yeager	113	3,503
Seminole	13,786	427,366
Miscellaneous	644	19,964
Total	78,414	2,430,834
Creek County—	Daily Av.	Mo. Av.
Cushing-Shamrock	21,015	615,465
Mannford-Olive	682	21,142
Glenn Pool, Sapulpa and Kiefer	8,633	267,623
Bristow, Kellyville and Depew	26,015	806,465
N. Bristow (Twp. 17-8)	2,720	84,320
Eastern Bristow or Slick	5,666	175,646
Total	64,731	2,006,661
Pawnee County—	Daily Av.	Mo. Av.
Cleveland	4,909	152,179

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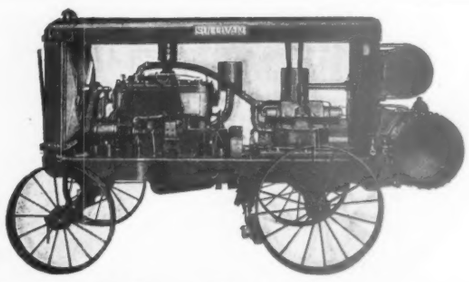

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	Daily Av.	Mo. Av.
Keystone	2,590	80,290
Jennings	5,171	160,301
Otoe or Watchorn	2,935	90,985
Masham	60	1,860
Ralston	214	6,634
Total	15,879	492,249
Payne County—	Daily Av.	Mo. Av.
Yale, Quay and Ingalls	6,657	206,367
No. Cushing or March Pool	2,712	84,072
Deep Rock (23-18-3)	3,164	98,084
Total	12,533	388,523
Lincoln County—	Daily Av.	Mo. Av.
Stroud	2,029	62,899
Davenport	6,968	216,008
Kendrick or Skelly	1,954	60,574
Total	10,951	339,481
Kay, Grant and Noble Counties—		
Blackwell	1,717	53,227
Northwest Blackwell	1,671	51,801
Deer Creek	67	2,077
Ponca City	816	25,296
Mervine	325	10,075
North Braman	4,076	126,356
South Braman	8,970	278,070
Hubbard	2,024	62,744
Thomas	2,564	79,484
Tonkawa	37,615	1,166,065
Billings	308	9,548
Miscellaneous	369	11,439
Total	60,522	1,876,182
Garfield County—		
Garber	32,305	1,001,455
Carter County—		
Healdton	15,013	465,403
Hewitt	11,195	347,055
Graham	7,481	231,911
Fox	3,419	105,989
Brock	1,416	43,896
Tussy or Scholem Alechem	7,311	226,641
Total	45,835	1,420,885
Stephens-Cotton Counties—		
Loco-Milroy	2,297	71,207
Comanche	663	20,553
Duncan	5,682	176,142
Walters	905	28,055
Kilgore	159	4,929
Knox	1,282	39,742
Total	10,988	340,628
Pontotoc County—		
Lloyd	80	2,480
Allen	236	7,316
Frances	209	6,479
Total	525	16,275
Caddo County—		
Cement	1,904	59,024
Garvin County—		
Robberson	2,929	90,799
Beckman County—		
Sayre	62	1,922
Jefferson County—		
Hambro	2,860	88,660
Pottawatomie County—		
Maud	27	837
Marshall County—		
Madill	88	2,728
Total	471,556	14,615,236
Total	472,822	14,657,482
Difference	1,266	42,246

NORTH AND CENTRAL TEXAS
Daily Average and Total Monthly Production in August, 1926

	Daily Average	Monthly Average
N. Cen. Texas—		
Burkburnett	12,211	378,541
Electra	15,944	494,264
Iowa Park K. M. A.	4,302	133,362
Archer County	29,862	925,722
Clay County	564	17,484
Wilbarger County	14,526	450,306
Montague County	6,009	186,279
Young County	8,271	256,401
Baylor County	165	5,115
Total	91,854	2,847,474
Central Texas—	Daily Av.	Mo. Av.
Clear Fork	5,028	155,868
Breckenridge	5,433	168,423
Caddo	3,256	100,936
Ranger-Eastland	4,891	151,621
Rising Star	73	2,263
Sipe Springs	141	4,371
Desdemona	1,769	54,839
Pioneer	613	19,003
Brown County	12,466	386,446
Calahan County	4,191	129,921
Coleman County	1,808	56,048
Throckmorton County	1,410	43,710
Jack County	180	5,580
Palo Pinto County	642	19,902
Shackleford	9,590	297,290
Cooke County	200	6,200
Total	51,691	1,602,421
West Texas—		
Crane	615	19,065
Reagan County (Big Lake)	28,846	894,226
Mitchell County	3,582	111,042
Howard County	218	6,758
Scurry County	52	1,612
Upton County	3,931	121,861
Crockett County	1,101	34,131
Total	38,345	1,188,695
Panhandle—		
Carson County	3,770	116,870
Hutchinson County	88,246	2,735,626
Wheeler County	74	2,294
Gray County	3,789	117,459
Potter County	29	899
Total	95,908	2,973,148
East Central Texas—		
Powell	28,592	886,352
Mexia and Nigger Creek	33,154	1,027,774
Currie	782	24,242
Richland	1,705	52,855
Wortham	6,032	186,992
Total	70,265	2,178,215
Total all fields August	348,063	10,789,953
Total all fields July	299,645	9,288,995
Difference	48,418	1,500,958

NORTH LOUISIANA
Daily Average and Monthly Production in August, 1926

	Daily Av.	Mo. Prod.
Bellevue	2,128	65,968
Caddo light	10,205	316,356
Caddo heavy	2,821	87,451
Cotton Valley	7,947	246,357
De Soto & Red River	4,094	126,914
Elm Grove	557	17,267
Haynesville	9,524	295,244
Homer	5,561	172,391
Urania	13,986	433,566
Total August	56,823	1,761,513
Total July	57,425	1,780,175
Difference	602	18,652

ARKANSAS
Daily Average and Monthly Production in August, 1926

	Daily Av.	Mo. Prod.
Smackover heavy	121,951	3,780,481
Smackover light	15,014	465,434
El Dorado	7,156	221,836
Lisbon	9,422	292,082
Nevada	1,977	61,287
Stephens	1,841	57,071
Total August	157,361	4,878,191
Total July	161,932	5,019,892
Difference	4,571	141,728

GULF COAST, TEXAS-LOUISIANA
Daily Average and Monthly Production for August, 1926

District—	Daily Average	Gross Bbls.
Boling	2,525	78,275
Batson	1,437	44,547
Blue Ridge	1,262	39,122
Big Creek	2,325	72,075
Barber Hill	592	18,352
Dayton	104	3,224
Damon Mound	792	24,552
Edgerly, (La.)	835	25,885
Goose Creek	11,131	345,061
Humble	4,645	143,995
Hull	17,256	543,936
High Island	201	6,231
Jennings, (La.)	1,365	42,315
Lockport, (La.)	4,800	148,800
Markham	77	2,387
Nash Dome	637	19,747
Orange	8,572	265,732
Orchard	201	6,231
Pierce Junction	3,805	117,955
Piedras Pintas	102	3,162
Spindletop	76,162	2,423,022
Saratoga	1,502	46,562
Sour Lake	7,224	223,944
South Liberty	4,799	148,769
Vinton, (La.)	6,766	209,746
West Columbia	9,250	286,750
Welsh-Anse La Bute, (La.)	80	2,480
*Miscellaneous	102	3,162
Totals for August	170,549	5,287,019
Totals for July	122,099	3,785,069
Increase	48,450	1,501,950

*Includes Nacogdoches, Washington and Kleberg Counties.

SOUTHWEST TEXAS

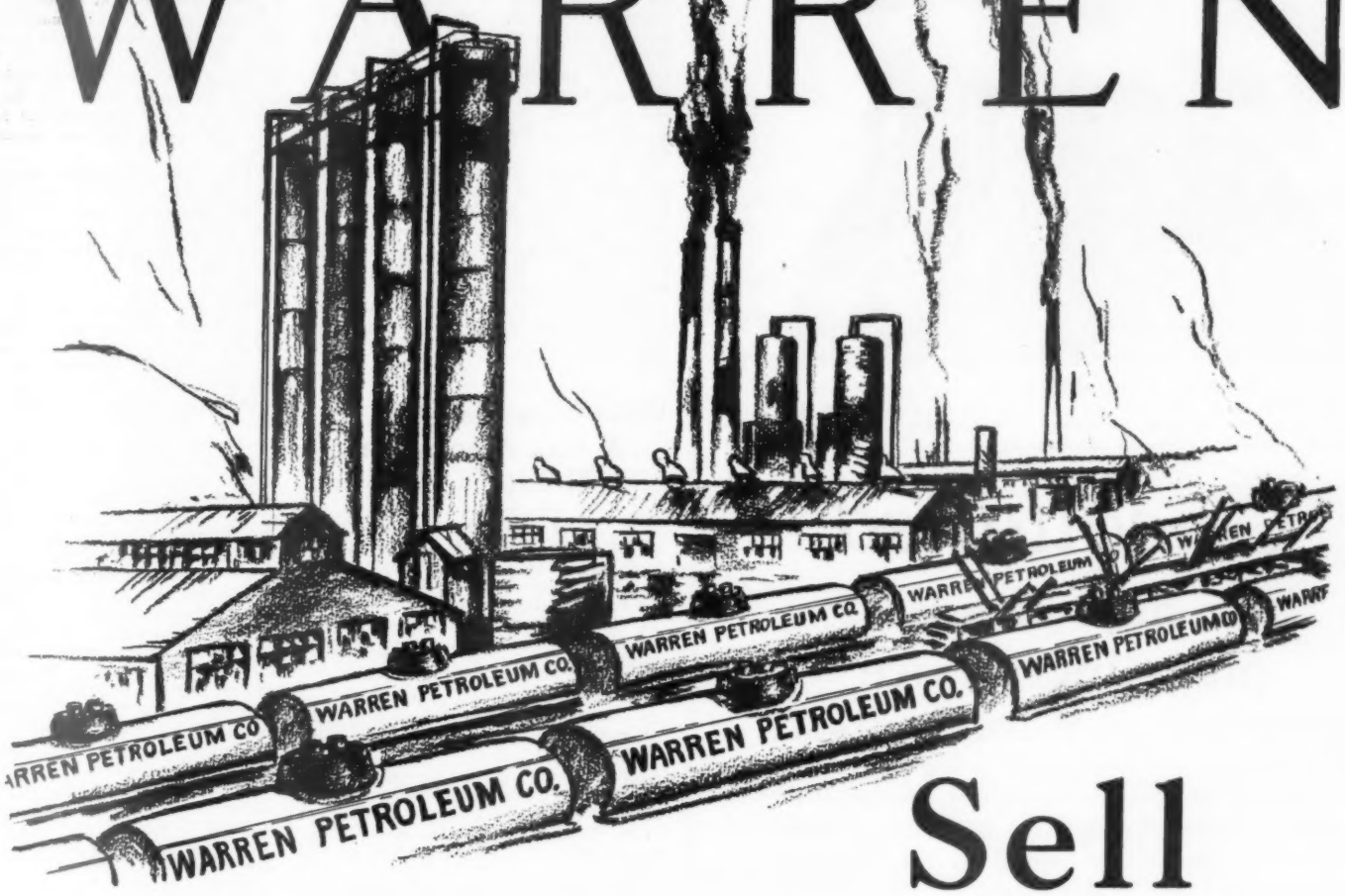
Field—	Daily Average	Gross Prodn.
Luling	22,155	686,805
*Mirando	16,612	514,972
Somerset	2,030	62,930
Callihan	107	3,317
Rockdale-Minerva	941	29,171
Lockhart, (Lytton Springs)	4,145	128,495
Total for August	45,990	1,425,690
Total for July	42,043	1,303,333
Increase	3,947	122,357

SHELL OF CALIFORNIA MAKES STAFF CHANGES

LOS ANGELES, Calif., Oct. 2.—The Shell Co., of California has made several changes in its staff. J. U. Stair, who has been appointed general superintendent succeeding Mr. Reinhardt, came to California and went to work in the oil fields in 1904 at Santa Maria for the Western Union Oil Co., becoming superintendent in 1909 until the company was taken over by the Union of Delaware interests in 1918. In 1919 he was made general superintendent of the various companies in California composing the group of the Union of Delaware, and when it was absorbed by the Shell Company in 1922 continued in charge of the Union of Delaware group until March 1, 1923, at which time the management and amalgamation were completed and he was assigned to the Signal Hill division as division superintendent. He served as division superintendent at Long Beach during the heavy drilling campaign and development of the Signal Hill, Santa Fe, Torrance Redondo and Dominguez Fields. On March 1, 1924, he was transferred to the Los Angeles office as assistant general field superintendent, and was appointed general field superintendent on July 1, 1926.

William Reinhardt, appointed production manager, on completing his education in the University of California joined the Shell Company in 1917 at Oilfields as Field Engineer. From January to October, 1921, he was assistant general field superintendent, for the Roxana Petroleum Corporation, in the Mid-Continent, and was appointed superintendent at Long

WARREN



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THE food you eat—you could probably raise it . . . milk—why not keep a cow? Chickens . . . these you could also raise—but do you? Your car . . . do you repair it yourself? Your house may need painting . . . will YOU paint it? Then why try to retail the gasoline you manufacture? . . . you probably could, but for the same reason you leave other jobs for those *skilled* in them, why not do the same in this?

Now handling the output of nearly forty plants under contract

Service Counts...

Leave this job up to the largest Natural Gasoline Marketing Organization in the country. When the Warren Petroleum Company purchases your output . . . you load the cars and deposit the checks . . . you eliminate retail selling costs and take care of your own job—manufacturing.

We should like to outline our plan to you, covering the purchase of your output for 1927.

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FIRST NATIONAL BANK BLDG. TULSA, OKLAHOMA

5½-6½ inch by 24 inch Horizontal Triplex Double-plunger Oil Pipe line Pump. Capacity with 6½ inch plungers, 32,000 barrels per 24 hours at 47 r.p.m. against 700 lb. per sq. in. One of 77 Worthington Forged-fluid-end Pumps supplied to a prominent pipe line company.

Unequalled

for high-pressure pipe-line service

EVERY detail of the Worthington forged oil-end pump has been designed and fabricated to give the highest degree of strength and mechanical excellence, combined with proper hydraulic efficiency. Wherever used it has proved its pre-eminence, especially on the highest pressures.

Some of the outstanding points of superiority are:

1. Freedom from breakage in oil-end
2. Homogeneous forged oil-end eliminates leakage and sweating
3. Pressure joints minimum in number and of greatest tightness
4. Gaskets on pressure side of pump practically eliminated
5. No studs to break off in making pressure joints
6. Heights of oil-end above center line of pump less than obtained in any other construction. This minimizes suction lift and makes it possible to draw the oil from the bottoms of the tanks with maximum volumetric efficiency
7. Comparatively small clearance enables pump to be used in emergency as a suction pump—up to high vacuum without difficulty on closed system
8. Straight flow, as opposed to reversal of direction
9. No long, crooked passages
10. Ball valves of hardened steel with steel seats, readily accessible.

Standard capacities range up to 50,000 barrels per 24 hours, standard pressures up to 800 lb. per sq. in. but pumps for any required capacity and pressure can be readily supplied. Ask for Bulletin 13-D-1302.

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Beach, October, 1921, assistant general field superintendent, March, 1923, and general field superintendent, 1924. Age 42.

Walter Elliot appointed as superintendent at Long Beach, is also a graduate of Stanford University, (1910) and worked several years for Standard Oil Co., around Montebello and Murphy Coyote Fields. Later he became superintendent of the Western Union Oil Co., at Santa Maria, and in March, 1923, was appointed superintendent of the Shell Company at Oilfields.

F. E. Rehm, who has been appointed assistant general field superintendent, graduated from Stanford University, in 1915 and went to work immediately for the Shell Company at Ventura as petroleum engineer. He was appointed superintendent at Oilfields, Calif., July, 1922, transferred to Ventura, January, 1923, to Brea in March, 1924, and to the Long Beach division as superintendent, March, 1925.

West Virginia Oil & Gas Association Holds Big Meeting

By Charles L. Hurst

PARKERSBURG, W. Va., Sept. 29. J. J. Evans, of Clarksburg, was elected president of the West Virginia Oil and Natural Gas Association this morning at the closing of the annual meeting here. Mr. Evans is well and prominently known among oil operators of the state, and his election was favorably received.

John P. Flynn, of Sistersville, was elected vice president; Edwin Robinson, of Fairmont, was re-elected secretary-treasurer, and James H. Dye, Charleston, retiring president; George A Hatzel of Weston. W. H. South of Morgantown, Henry B. Davenport of Charleston, J. B. Wallace of Wheeling and Wallace B. Gribble of Clarksburg were elected directors.

The Parkersburg Rig & Reel Co. was host to the convention at noon yesterday. Automobiles conveyed the members to the plant where luncheon was served at noon and a general inspection of the plant conducted. Parkersburg Rig & Reel products are widely used by oil men in West Virginia, and the members were greatly pleased to see the plant from which they come.

A resolution thanking the city officials, Nemesis Shrine, Board of Commerce, Parkersburg Rig & Reel Co. and the city of Parkersburg for the hospitable reception given the convention was passed unanimously.

Addresses on technical subjects were given yesterday by J. C. Chisler, assistant treasurer of the Hope Natural Gas Co; S. W. Weals, vice president of the Carnegie Gas Co., and H. A. Hitchcock, manager of the commercial department of the Union Gas & Electric Co., Cincinnati.

James H. Dye, president of the association, reviewed conditions of the industry both in West Virginia and the entire country. A discussion of taxes, as applied to the oil industry, was given by Mr. Dye, who assailed discriminatory legislation against the oil and gas interests, the most valuable possession of the state.

In the course of his address President Dye said:

"We are engaged in a business that is supposed to be slowly dying out, for the commodity that we produce and sell is a natural one that is steadily being depleted. Yet, in spite of the fact that we are depleting our stock in trade with no possibility of ever replenishing it, our business today is in a healthy condition.

"Many of you recall the time when West Virginia was not considered as a manufacturing state. No one thought its future lay in that direction. It was a state of great natural resources. But our natural gas resources served to wield a more comprehensive way, a much wider influence on the industrial development of the state.

"I think that there was never a greater influence exerted in behalf of a people than that brought to bear by the oil and gas people on West Virginia's people of the hills. The development of the industry soon changed living conditions. Men of the world—men of education and experience—came to live among these people and the influence was immediately felt. With them came new ways of making a livelihood. They broke a path out of the wilderness to the flat country below where the larger towns and cities were and culture had had opportunity to grow.

"Then came the public school system. With the opening of the hill country the oil and gas people and other developers saw the need of educational facilities among these people. They set to work to bring the school to the scattered communities.

"The new contacts were of the best. The oil and gas industry brought to the state a class of workers that was of the highest. Trained workers and educated executives came to live among the people of the hills. The class of labor that came into the state asked nothing of the state government. The oil and gas industry stands out alone in the class of labor that it has brought into the state. Neither the state nor any department of it is put to any expense in looking after the industry. The people employed in it have assured this from the first.

Discriminatory Taxation

"Yet the oil and gas industry has not failed to bear its full burden of the expense of government. In fact, we may well say that in proportion to our investment we pay by far in greater amount. The oil and gas utilities of this state are assessed by the Board of Public Works at nearer their true and actual value than any other class of property in the state. We have records that show that some of our property has been assessed at a higher value for taxation purposes than it could be sold for outright.

"In the taxable valuation of oil and gas there is no doubt that it is assessed at more than its true and actual value. Oil is assessed at $3,000 per barrel daily production regardless of where it is located or the expense of production. While there is oil production in West Virginia that is worth $3,000 per barrel, the larger bulk of it could not be sold at anything like this figure.

"In Ohio the same grade of oil on the same ad valorem basis is assessed at $1.500 per barrel daily production. We feel that we contribute a full share of property taxes to the state and counties. We do not desire to avoid payment of our share of the cost of government, but we do protest at the inequality of it. If all property were assessed at a figure as near its true and actual value as are West Virginia oil and gas utilities there would be sufficient revenue to take care of all departments of the state without an indirect tax.

"Besides the ad valorem or direct property taxes assessed upon oil and gas in many cases in excess of the true value of such property or its selling price, the state has taxed the oil and gas business and other occupations indirectly by imposing privilege or occupation taxes, and in every instance a discrimination has been made against oil and gas. The Gross Sales Tax Act, passed by the 1921 Legislature, made the rate of such privilege or indirect tax, in the case of the mining of coal, oil and gas and other minerals, two-fifths of 1 per cent of the value of the mineral produced. The same act taxed the privilege of selling tangible property at one fifth of 1 per cent of the proceeds of sale and other occupations in the state at the same or lesser rates, that is to say, the tax on the mining industry was twice what it was on any other industry or business.

Ten Times Greater

"The Tax Act, effective July 1, 1925, indicates that the acceptance of this discrimination in silence by the oil and gas interests has borne its fruit, for we find the 1925 act, whether it be a tax or gross proceeds or an occupation tax (and it is immaterial which it is) has made the rate for mining coal 42/100 or 1 per cent.

1 per cent for mining or producing oil and 1 17/20 per cent for mining or producing natural gas and 9/20 of 1 per cent for mining or producing other minerals and lumber, and while other occupations are taxed none are taxed at a rate in excess of 3/10 of 1 per cent, and many at lesser rates. But besides these drastic and explicit discriminations against the oil and gas interests, by drafting the act to apply this percentage to the proceeds of sale, whether the gas be sold within or without the state, the practical as well as the intended result, in the case of producers having their own gas pipeline systems, is to make the tax, in the case of natural gas, eight or ten times greater than in the case of the mining or producing of any other mineral except oil.

"Let us go back for a few years and trace the history of the oil and gas industry briefly. To my mind it is the greatest of business romances. Let us begin at the beginning of oil and gas development in West Virginia and sketch lightly its progress down through the years.

Discovery of Gas

"We of the Great Kanawha Valley take pride in the fact that the discovery and embryonic development began there. This was in 1805 1808 and it was in the vicinity of Charleston, my home town and yet today an important gas-producing section of the state.

"They didn't go down for oil—those old pioneers. When they drilled their first oil and gas wells they were really after salt brines. The Ruffner brothers were actively engaged in salt making a few miles east of Charleston. As a consequence of drilling they invented rather crude casing, drilling tools, pumping machinery and other implements. These things were crude, but to these men can be directly traced the origin of virtually all of the mechanical apparatus used today in drilling oil and gas wells.

"When the Ruffners attempted to drill for salt brines, 10 miles above Charleston, on the Great Kanawha River, they picked a spot in all innocence on the Warfield anticline. Unexpectedly they found a large flow of natural gas. It was a useless curiosity to them for many years, but we are told that this gas was finally utilized by one William Tompkins in 1841 in the evaporation of salt brines, displacing the use of several hundred bushels of coal daily, as a fuel.

"We have the eminent authority of State Geologist I. C. White for much of the history of the development. He tells us that the real development of the state's oil and gas resources did not begin until the spring of 1860. The drillers really went down after oil that time. The well was sunk on the Rathbone tract, near Burning Springs, on the Little Kanawha River, in Wirt County.

"It was a considerable development, but misfortune overtook it in 1863, at the height of its development, when General Jones, at the head of two or three thousand Confederate soldiers, captured the whole works in one swoop, set fire to everything, destroyed buildings, derricks and several thousand barrels of oil and wrecked all the machinery. It was an act of warfare, done to circumvent the Federal troops.

Beginning of Production

"This put a damper on the oil business in West Virginia for several years except along the line of the Volcano anticline. But in 1888 Hart and Brockmeier, of Wheeling, went into it extensively on an island in the Ohio River, near Belmont, at the northern end of the Volcano anticline, where it passes into the state of Ohio.

"This Ohio River oil and gas development, together with the opening up of the Mannington oil and gas field in 1889, was the real beginning of the production of oil and gas in West Virginia on a large scale, the oil production reaching its peak in 1900 with 15,000,000 bbls., and the gas production reaching its high point in 1917 with a commercial production of nearly 309,000,000,000 feet. From these two high points, 1900 to 1917, oil and gas production in this state passed over the hill and began the long downward trail to the point of extinction that Doctor White has estimated will overtake our oil in 1981 and gas in 30 or 40 years.

"It is interesting to go back to the records and follow the trend of petroleum production. I will not burden you with a mass of figures, but will quote just enough to trace the course of production. The records were not at all accurate between the years of 1859 and 1876, but the total production for that period is estimated at 3,000,000 bbls. In 1876, 120,000 bbls. were produced in West Virginia. Production fluctuated until it dropped to 90,000 bbls. in 1884. From that point on, the advance was steady. There was a total production of 492,578 bbls. in 1890. Then production took a great leap forward with 2,406 218 bbls. in 1891. The peak, with 16,195,675 bbls., to be exact, was reached in 1900. From that time on there has been a slow but sure decline until the production in 1925 was 5,763,000 bbls.

"We are told that there is less than 180,000,000 bbls. left in the sands of this state. This, of course, is the estimate of recoverable oil. We know that a certain per cent of the oil is not recoverable under present methods of production. Perhaps the future may bring about the introduction of methods of getting this irrecoverable oil to the surface. Those of you who love to allow your imaginations to have full play at times may revel in this speculation.

Natural Gas Output

"The records of natural gas production are meager until 1906. In 1885 we learn that gas to the total value of $40,000 was sold in the state. The figures rose to $120 000 in 1887 and held to that total in 1888, but dropped after that, hitting the lowest point of $5,500 in 1890.

"Our first accurate record of total amount of gas sold was in 1906, when there were 119,400.392.000 feet sold. Steadily and consistently total sales climbed until 1917 when a total of 308,-617,101,000 feet was sold. The decline then began until the sales for 1921 were 167,227,696.000 feet. It has since risen slowly reaching 175,786,952,000 feet in 1925. This gradual increase is not altogether the result of new production, but is largely accounted for by the fact that we have made greater withdrawals from existing wells to supply a steadily increasing number of domestic consumers.

"It is characteristic of human nature that we should start to conserve only when we finally become alarmed at the approach of total elimination of a commodity. But we can at least congratulate ourselves that we have not waited until the horse escaped before shutting the stable door. When we did start to conserve, we went about it in the right way and adopted no half-way measures. Testifying to this is the enlisting of the consuming public in this very conservation movement.

"It has been estimated by one authority that the producers themselves wasted more than 2,100,000,000,000 feet of gas in this State before they woke up to what they were doing. We all know of the wasteful methods of other years. Leaking gas lines, laid on top of the ground, sizzled away merrily while billions of feet of gas were turned loose into the air at the wells. For 20 years, from 1889 to 1909, the waste was unbridled. There were no meters for many years after we started to sell gas to the consumer. Municipalities lighted their streets with it, and the jets burned all day because there was nothing to save by hiring men to turn it out in the morning and light it again at night. Domestic consumers burned it day and night without stint, and manufacturers cared not how much was senselessly wasted.

"In this connection I want to say that we are under obligations to the Public Service Commission of West Virginia for the lasting benefit they bestowed upon the gas industry and the public when they made their wise ruling that all gas used or sold shall be metered.

Public Now Friendly

"A number of years ago a big business

(Continued on Page 325)

GENUINE "TOLEDO" TOOLS— YOU CAN'T EQUAL THEM FOR SERVICE

Year in and year out you will find that "TOLEDO" tools will thread the pipe easier, smoother, and more satisfactorily than any other pipe tools.

For twenty-five years genuine trade-marked "TOLEDOS" have been specified by experienced operators, who know the difference between genuine "TOLEDOS" and ordinary pipe threaders.

If you, too, would enjoy this satisfactory service, specify a genuine "TOLEDO" trade-marked pipe threader the next time.

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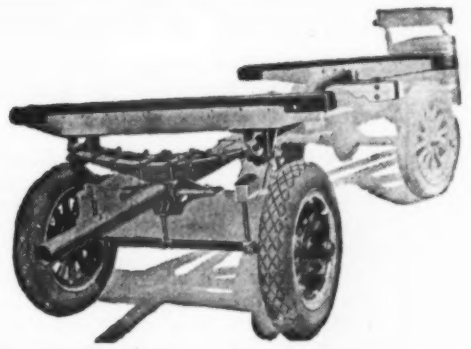

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F.O.B. Mansfield Fully Equipped

Nabors Trailers take to an oil field like a duck to water.

When the goin's tough and there are heavy loads to be hauled in, you'll find truck drivers tying onto Nabors Trailers.

And into new fields Nabors Trailers are taken as a part of regular equipment—for they can be depended on.

Verily, they're the wildcat's playmate.

Sold Through Authorized Truck Dealers

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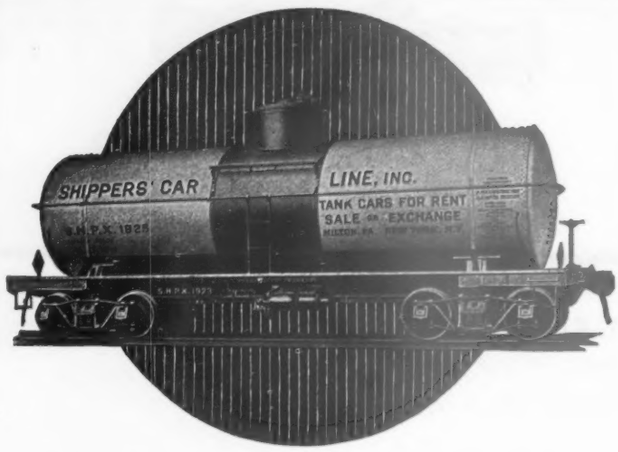

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The Pump That

Scattered Skepticism

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Regular Style Working Barrel Pumps were a novelty less than five years ago. The early skepticism that greeted them has long since vanished.

Today they are still a novelty in their exclusive design but thousands of them have won their right to recognition throughout all oil producing territory.

It is their novelty that allowed many producing companies to prove their worth to the extent of using them today as their standard pump.

This same novelty will convince you also that the radically different features of this pump's operation are worthy of standardization for your wells.

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Northrup Equipment Company

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Oil Well Supply Company stocks the complete line of

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Pumping Equipment

OIL AND GAS INDUSTRIES CONSUME SIX PER CENT OF COUNTRY'S STEEL

By B. E. V. Luty

PITTSBURGH, Pa., Oct. 2.—In 1926 the oil and natural gas industries are consuming fully 6 per cent of the steel made in the United States, the quantity being at least 2,000,000 gross tons. The estimate is not padded, as estimates of steel consumption by various industries sometimes are, by inclusion of a portion of the steel used by other activities serving the industry, such as the railroads. It includes merely steel used at and in oil and gas wells, line pipe, oil storage tanks and machinery used by wells, pipelines and refineries.

It may be estimated that there has been a doubling in this consumption in approximately 15 years. There are no early statistics to permit a close comparison. Statistics of production of oil country tubular goods at the pipe mills begin with 1913 and from that year to 1926 there is an increase of about 85 per cent. Statistics of oil storage tanks begin with 1923, while other lines of oil and gas consumption of steel must still be merely estimated.

In the official statistics of iron and steel production the production of welded tubular goods is divided into black standard, galvanized standard, oil country goods, O. D. and miscellaneous and boiler tubes. Black standard and galvanized standard represent the ordinary merchant pipe of every-day use. The designation "oil country goods" includes line pipe as well as casing, tubing, rotary drill pipe, etc. Production has been reported as follows, the writer appending an estimate for 1926:

Oil Country Goods—Gross Tons

1913	841,089
1914	619,291
1915	602,920
1916	940,491
1917	887,903
1918	794,769
1919	1,068,914
1920	1,261,778
1921	891,995
1922	1,139,834
1923	1,358,889
1924	1,183,867
1925	1,018,302
1926	*1,550,000

*Estimated.

The production of all welded tubular goods in 1925 is given below, that year having stood second to 1923, statistically the record year, though there seems to be no doubt that this year will make a new record.

Welded Tubular Goods

	Gross Tons
Black standard pipe	1,232,376
Galvanized standard pipe	648,567
Oil country goods	1,018,302
O. D. and miscellaneous	168,519
Boiler tubes	62,778
Total welded	3,030,541

Of the above total, 151,112 tons were wrought iron and 2,879,429 tons steel.

Production of seamless steel tubes has grown from 108,567 tons in 1913 to 568,190 tons in 1925. This material has been going into oil country goods quite extensively of late, particularly for rotary drilling. The cost has decreased relative to welded pipe and the vogue is likely to increase greatly.

The following figures on cast iron pipe production are in net tons of 2,000 pounds, while iron and steel statistics generally are in gross tons:

Cast Iron Pipe Production, 1925

	Net Tons
Gas and water pipe	1,353,756
Gas and water fittings	60,496
Soil and plumbers' pipe	377,146
Soil and plumbers' fittings	133,337
Total cast iron	1,924,735

The Department of Commerce has been reporting the bookings in fabricated steel plate, beginning with the year 1923, by lines of consumption. The bookings in oil storage tanks and refinery materials and equipment have been as follows, in net tons of 2,000 pounds:

	Net Tons	
	Oil Tanks	Refinery
1923	296,128	17,114
1924	123,368	11,289
1925	87,541	24,964
1926*	140,000	28,000

*Approximate, based on returns for eight months.

Summary of Consumption

By comparing trade conditions this year with those in previous years for which there are definite production statistics of oil country tubular goods, this year's tonnage may be set at say 1,550,000 tons. The oil and gas fields also use some ordinary merchant pipe and a considerable tonnage of seamless material, which can be estimated only roughly as there are no definite statistics for previous years to furnish a guide. Then there is machinery and other equipment at wells, pipelines and refineries, which can be estimated only roughly. Making all figures conservative, the total is approximately as follows, for steel consumption in the oil and gas industry from the wells through the refineries:

Oil country goods, welded	1,550,000
Merchant pipe and seamless	150,000
Storage tanks	125,000
All other	175,000
Total	2,000,000

Line pipe for gas and oil lines being reported, in the production statistics, merely as a part of "oil country goods" generally, there is no precise information as to line pipe consumption. Both the tonnage and the percentage have varied considerably from year to year, 1923 having been the year of heaviest line pipe demand. Some pipe mills have estimated the proportion of line pipe to total oil country goods in that year at 40 per cent, which would make about 550,000 gross tons. This year has been merely a fair one in line pipe, the heavy demand having been for casing and other well material. In fact, there might have been more line pipe contracted for had it not been that the mills were so busy that line pipe business was not particularly sought. Deliveries were difficult to arrange and mills would not make the price inducements they have sometimes made to get large line pipe orders to furnish an operation.

Pipe Making Progress

The earliest pipe was made of reeds, with the pith pushed out. Later, logs were bored. Even in recent years water wells so equipped have been in use. Cast iron pipe came next, and has been in use in Europe for centuries. It is said that cast iron water mains in use for 75 years have been dug up and used again.

Wrought iron pipe came next and has been gradually but not entirely supplanted by steel pipe. The Bessemer steel making process was invented in the fifties and the regenerative furnace, which made the open-hearth steel process feasible by furnishing the high heat necessary, at about the same time.

Alike in the manufacture of wrought iron, Bessemer steel or open-hearth steel, pig iron produced in the blast furnace is the primary material. It contains 4 to 5 per cent of carbon, the great bulk of which must be removed. Making wrought iron by the puddling furnace was a very laborious process. A great advantage of the Bessemer process was its speed. It became a tonnage proposition in a short time, while the open-hearth process was used chiefly in manufacture of fine steel.

The first extensive use of Bessemer steel was in the manufacture of rails. It was in 1877 that the production of steel rails first exceeded that of iron rails. About 10 years later it was found that steel could be welded, in the manufacture of pipe, the same as wrought iron, and steel then began to supplant wrought iron in pipe manufacture as it did in various other lines, so that before the end of the last century steel was the common material, wrought iron being a relatively minor product.

Later, open-hearth steel in turn made inroads on Bessemer steel, which had its largest production in 1906, 20 years ago. Bessemer steel is now a minor product. It retained its favor in pipe manufacture longer than in most other lines, on account of its threading better, but in recent years the threading qualities of open-hearth steel have been brought up to the requirements.

WEST VIRGINIA OIL & GAS ASSOCIATION

(Continued from Page 319)

man of this country made an unfortunate remark—or it is attributed to him. The words he is said to have used were 'The Public Be Damned.' Yet out of that supposed occurrence grew a new order of things—a different attitude of producer toward consumer and a more friendly feeling of consumer for producer. Today we have big public service corporations all over the country with their first thought the comfort and pleasure of the public they serve. They know that the good will of the public is the most valuable asset they have and they strive first of all to get that good will then, all the time, to keep it.

"This changed attitude toward the public has served the gas people well in recent years. When we determined to adopt a more rigid policy of conservation through the education of the public along those lines we found that the consumer lent a ready ear. The public as a whole is fair. It does not demand that service be rendered them without adequate compensation. With the establishment of a growing public confidence we are finding less opposition to the establishing of higher rates and the consumer is fast coming around to our suggestions for more economical use of this fuel. Through a carefully prepared educational campaign we are showing the public that with higher rates and more conservation the consumer really saves money. Once he would have laughed at such a proposition. Now he stops to think, and, thinking, he learns. We are fast doing away with the false notions of an inexhaustible supply, low rates and waste which formerly prevailed.

Campaign of Education

"This campaign of education began when the producer and distributor of natural gas awoke from his long, comfortable sleep and realized that the supply was not going to last forever, with the consumers increasing and the gas fields being steadily drained. It was apparent that something drastic had to be done. There must be a more equitable distribution, and waste must be stopped if the consumer was to have the benefit of this almost perfect fuel for any considerable length of time. It was seen that failure to appreciate the value of natural gas was largely responsible for this. The consumer had come to look upon it as a permanent institution and the realization of its blessings had become lost because of years of familiarity. It was necessary to awaken him to a new realization of these things. Hence the educational campaign that is showing excellent results.

"Every one knows now that higher rates force economical use of gas and stop waste. This is proved by the fact that the revenue of distributing companies has not increased materially with higher rates, the consumer invariably using less gas in proportion to higher rates paid. Today the waste is comparatively low. It seems apparent, therefore, that had there been a policy of conservation three years ago, the life of the natural gas industry would have been prolonged for many years more and the public benefited proportionately.

"So let us carry on our policy of The Public Be Served. Let us foster this good will that is benefiting producer and consumer alike. Let us remember the little things that make for good feeling when we come in contact with the people who use our product. Let us feel that we owe to these people the most kindly consideration, not only because it is good business, but because it is man's greatest privilege to serve kindly and well."

LOUISIANA-ARKANSAS

(Continued from Page 50)

The well was completed last month at 2,045 feet as a 35-bbl. pumper.

Ouachita County

Humble Oil & Refining Co.'s No. 10 Hildebrant, Section 28-15-15, is pumping 150 bbls. of fluid, 42 per cent b.s., from sand at 2,591-96 feet. J. A. Reynolds' No. 3 Ratch & Cartier, Section 2-14-18, was dry and abandoned at 1,897 feet. Sure Oil Co.'s No. 4 Snyder, Section 34-15-15, was good for 250 bbls. on the pump from sand at 2,342-53 feet. In the Stephens district Ohio Oil Co.'s No. 5 T. Hall, Section 31-15-19, is a 32-bbl. pumper from sand at 2,153-73 feet.

Arrangements are being made to whipstock at 1,900 feet at W. H. Copenhaven's No. 2 Berg, Section 13-15-17. Six-inch casing was cemented at 2,368 feet at Gulf Refining Co.'s No. 12 Goodwin, Section 32-15-15; No. 22-A Umsted, same section, is drilling at 2,231 feet; No. 23-A is drilling at 2,003 feet. Eight and one-four h inch casing was cemented at 2,340 feet at Lion Oil & Refining Co.'s No. 5 Hays, Section 4-16-15. Magnolia company's No. 10 Goodwin, NE cor. Lot 2, NW, Section 5-16-15, is being rigged to deepen. It was completed last February at 2,530 feet as a 20,000,000-foot gasser. Six-inch was cemented at 2,277 feet at A. Meek's No. 3 Clawson, Section 35-15-17. Phillips company's old No. 16 Joyce, Section 33-15-15, is drilling at 2,626 feet and was formerly completed at 2,583 feet, making 30,000,000 feet of gas. Ten-inch was set at 40 feet at J. D. Reynolds' No. 3 Cramer, SE cor. SW SW, Section 22-15-16.

Roxana Petroleum Corp.'s No. 7 Berg, Section 28-15-15, is being bailed to test sand at 2,636-37 feet. Standard Oil Co.'s No. 12-B Murphy, SE cor. SW NW, Section 28-15-15, is a rig. Four and one-half inch casing was cemented at 2,581 feet at Standard Oil Co.'s No. 7-B Umsted, Section 32-15-15. Sun Oil Co.'s No. 7 Hardin, Section 27-15-16, is a rig. A. M. Sutton's No. 2 Schoolhouse, Section 28-15-16, is drilling at 250 feet. In the Stephens district, Magnolia Petroleum Co.'s No. 6 Watson, Section 31-15-19, is waiting for 6-inch to set at 2,140 feet. Ohio Oil Co.'s No. 4 Betty Hall, Section 31-15-19, is being rigged.

Columbia County

Gulf Refining Co.'s No. 1 Hughes, Section 37-17-22, is being rigged. Kentucky-Arkansas Petroleum Co.'s No. 1 Peter Doss, Section 29-19-20, has resumed drilling after several months of idleness and is drilling chalk rock at 2,480 feet.

Nevada County

For the third consecutive week the Nevada Pool has added a well to its list making better than 100 bbls. Humble Oil & Refining Co.'s No. 2-B Groves, Section 1-14-21, was completed in sand at 1,128-36 feet pumping 125 bbls. A derrick is up for Bemis and associates' No. 5 Ellis, C SE SE, Section 2-14-21. Humble company's No. 4 Bodeau, Section 10-14-21, is drilling broken lime at 3,009 feet. Humble company's No. 1 Womack, NW cor. Section 16-14-21, is drilling at 115 feet. A derrick pattern is on location for Ohio company's No. 1 McKinney, 210 feet north and 205 feet west, SE cor. W half SE NE, Section 9-14-21.

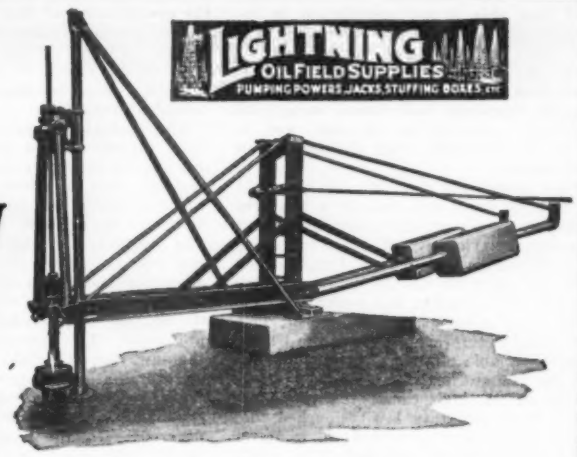
CO-OPERATION, NOT COERCION, IS NEEDED

(Continued from Page 31)

of the other owners of land above the field. But the right of the landowner which is so protected is, under the present rule of law, the right to reduce to possession the oil or gas that may come into his wells, either from his own land or from that of others, by measures declared to be, in the then state of the industry, proper and not wasteful. The right preserved by the police power, as at present declared, is that of private, competitive operation, not community operation nor a division of profits.

Serious Situation

If the efforts of petroleum engineers and lawyers be bent to legislation calling on the police power of the oil producing states to enforce unit operation, based on the right of various property owners to distributive shares of the oil produced on the land of one, instead of to a removal of restrictive laws which prevent the pooling of interests, a very serious



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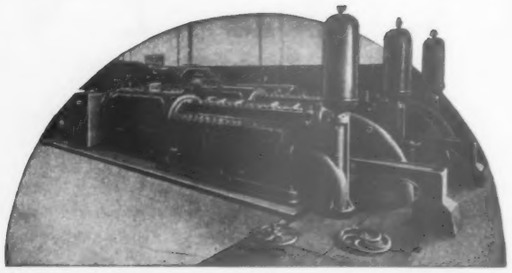
A FIVE-LINE Classified Ad (30 words) can be inserted in The Oil and Gas Journal four times for $5.50—a small cost to acquaint 25,000 readers with your product or service.



5½-6½ inch by 24 inch Horizontal Triplex Double-plunger Oil Pipe line Pump. Capacity with 6½ inch plungers, 32,000 barrels per 24 hours at 47 r.p.m. against 700 lb. per sq. in. One of 77 Worthington Forged-fluid-end Pumps supplied to a prominent pipe line company.

Unequalled
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EVERY detail of the Worthington forged oil-end pump has been designed and fabricated to give the highest degree of strength and mechanical excellence, combined with proper hydraulic efficiency. Wherever used it has proved its pre-eminence, especially on the highest pressures.

Some of the outstanding points of superiority are:

1. Freedom from breakage in oil-end
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5. No studs to break off in making pressure joints
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9. No long, crooked passages
10. Ball valves of hardened steel with steel seats, readily accessible.

Standard capacities range up to 50,000 barrels per 24 hours, standard pressures up to 800 lb. per sq. in. but pumps for any required capacity and pressure can be readily supplied. Ask for Bulletin 13-D-1302.

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1231-8 (4)

Beach, October, 1921, assistant general field superintendent, March, 1923, and general field superintendent, 1924. Age 42.

Walter Elliot appointed as superintendent at Long Beach, is also a graduate of Stanford University, (1910) and worked several years for Standard Oil Co., around Montebello and Murphy Coyote Fields. Later he became superintendent of the Western Union Oil Co., at Santa Maria, and in March, 1923, was appointed superintendent of the Shell Company at Oilfields.

F. E. Rehm, who has been appointed assistant general field superintendent, graduated from Stanford University, in 1915 and went to work immediately for the Shell Company at Ventura as petroleum engineer. He was appointed superintendent at Oilfields, Calif., July, 1922, transferred to Ventura, January, 1923, to Brea in March, 1924, and to the Long Beach division as superintendent, March, 1925.

West Virginia Oil & Gas Association Holds Big Meeting

By Charles L. Hurst

PARKERSBURG, W. Va., Sept. 29. J. J. Evans, of Clarksburg, was elected president of the West Virginia Oil and Natural Gas Association this morning at the closing of the annual meeting here. Mr. Evans is well and prominently known among oil operators of the state, and his election was favorably received.

John P. Flynn, of Sistersville, was elected vice president; Edwin Robinson, of Fairmont, was re-elected secretary-treasurer, and James H. Dye, Charleston, retiring president; George A Hatzel of Weston. W. H. South of Morgantown, Henry B. Davenport of Charleston, J. B. Wallace of Wheeling and Wallace B. Gribble of Clarksburg were elected directors.

The Parkersburg Rig & Reel Co. was host to the convention at noon yesterday. Automobiles conveyed the members to the plant where luncheon was served at noon and a general inspection of the plant conducted. Parkersburg Rig & Reel products are widely used by oil men in West Virginia, and the members were greatly pleased to see the plant from which they come.

A resolution thanking the city officials, Nemesis Shrine, Board of Commerce, Parkersburg Rig & Reel Co. and the city of Parkersburg for the hospitable reception given the convention was passed unanimously.

Addresses on technical subjects were given yesterday by J. C. Chisler, assistant treasurer of the Hope Natural Gas Co; S. W. Weals, vice president of the Carnegie Gas Co., and H. A. Hitchcock, manager of the commercial department of the Union Gas & Electric Co., Cincinnati.

James H. Dye, president of the association, reviewed conditions of the industry both in West Virginia and the entire country. A discussion of taxes, as applied to the oil industry, was given by Mr. Dye, who assailed discriminatory legislation against the oil and gas interests, the most valuable possession of the state.

In the course of his address President Dye said:

"We are engaged in a business that is supposed to be slowly dying out, for the commodity that we produce and sell is a natural one that is steadily being depleted. Yet, in spite of the fact that we are depleting our stock in trade with no possibility of ever replenishing it, our business today is in a healthy condition.

"Many of you recall the time when West Virginia was not considered as a manufacturing state. No one thought its future lay in that direction. It was a state of great natural resources. But our natural gas resources served to wield a more comprehensive way, a much wider influence on the industrial development of the state.

"I think that there was never a greater influence exerted in behalf of a [illegible] than that brought to bear by the oil [illegible] gas people on West Virginia's peop[illegible] the hills. The development of the in[illegible] try soon changed living conditions. [illegible] of the world—men of education and [illegible] perience—came to live among these [illegible] ple and the influence was immedia[illegible] felt. With them came new ways [illegible] making a livelihood. They broke a [illegible] out of the wilderness to the flat coun[illegible] below where the larger towns and c[illegible] were and culture had had opportunit[illegible] grow.

"Then came the public school sys[illegible] With the opening of the hill country [illegible] oil and gas people and other develo[illegible] saw the need of educational facil[illegible] among these people. They set to work [illegible] bring the school to the scattered c[illegible] munities.

"The new contacts were of the h[illegible] The oil and gas industry brought to [illegible] state a class of workers that was of [illegible] highest. Trained workers and educa[illegible] executives came to live among the pe[illegible] of the hills. The class of labor that c[illegible] into the state asked nothing of the s[illegible] government. The oil and gas indus[illegible] stands out alone in the class of labor t[illegible] it has brought into the state. Neit[illegible] the state nor any department of it is [illegible] to any expense in looking after the [illegible] dustry. The people employed in it h[illegible] assured this from the first.

Discriminatory Taxation

"Yet the oil and gas industry has [illegible] failed to bear its full burden of the [illegible] pense of government. In fact, we m[illegible] well say that in proportion to our inv[illegible] ment we pay by far in greater amou[illegible] The oil and gas utilities of this state [illegible] assessed by the Board of Public Wo[illegible] at nearer their true and actual value t[illegible] any other class of property in the st[illegible] We have records that show that some [illegible] our property has been assessed at [illegible] higher value for taxation purposes th[illegible] it could be sold for outright.

"In the taxable valuation of oil a[illegible] gas there is no doubt that it is assess[illegible] at more than its true and actual val[illegible] Oil is assessed at $3,000 per barrel da[illegible] production regardless of where it is [illegible] cated or the expense of production. Wh[illegible] there is oil production in West Virgi[illegible] that is worth $3,000 per barrel, the la[illegible] bulk of it could not be sold at anyth[illegible] like this figure.

"In Ohio the same grade of oil on [illegible] same ad valorem basis is assessed [illegible] $1,500 per barrel daily production. W[illegible] feel that we contribute a full share [illegible] property taxes to the state and count[illegible] We do not desire to avoid payment of o[illegible] share of the cost of government, but [illegible] do protest at the inequality of it. If [illegible] property were assessed at a figure as w[illegible] its true and actual value as are W[illegible] Virginia oil and gas utilities there wo[illegible] be sufficient revenue to take care of [illegible] departments of the state without an[illegible] direct tax.

"Besides the ad valorem or direct pro[illegible] erty taxes assessed upon oil and gas [illegible] many cases in excess of the true value [illegible] such property or its selling price, t[illegible] state has taxed the oil and gas busin[illegible] and other occupations indirectly by i[illegible] posing privilege or occupation taxes, a[illegible] in every instance a discrimination h[illegible] been made against oil and gas. The Gr[illegible] Sales Tax Act, passed by the 1921 Leg[illegible] lature, made the rate of such privileges [illegible] indirect tax, in the case of the mini[illegible] of coal, oil and gas and other miners [illegible] two-fifths of 1 per cent of the value [illegible] the mineral produced. The same a[illegible] taxed the privilege of selling tangi[illegible] property at one fifth of 1 per cent of t[illegible] proceeds of sale and other occupations [illegible] the state at the same or lesser rates, th[illegible] is to say, the tax on the mining indus[illegible] was twice what it was on any other [illegible] dustry or business.

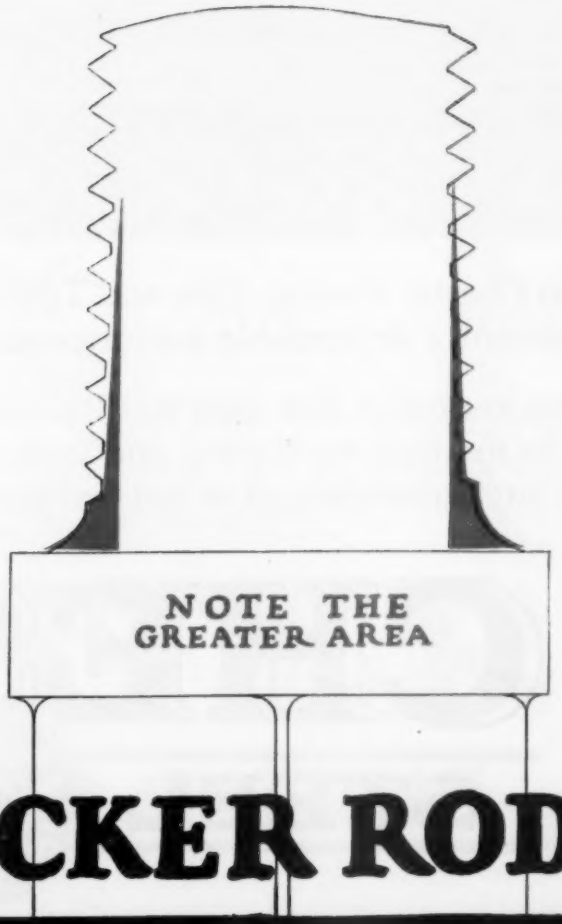
Ten Times Greater

"The Tax Act, effective July 1, 19[illegible] indicates that the acceptance of this d[illegible] crimination in silence by the oil and g[illegible] interests has borne its fruit, for we h[illegible] the 1925 act, whether it be a tax or gr[illegible] proceeds or an occupation tax (and [illegible] is immaterial which it is) has made [illegible] rate for mining coal 42/100 or 1 per c[illegible]

more pin area *than* ordinary Sucker Rods

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

Axelson *Vanishing* Thread



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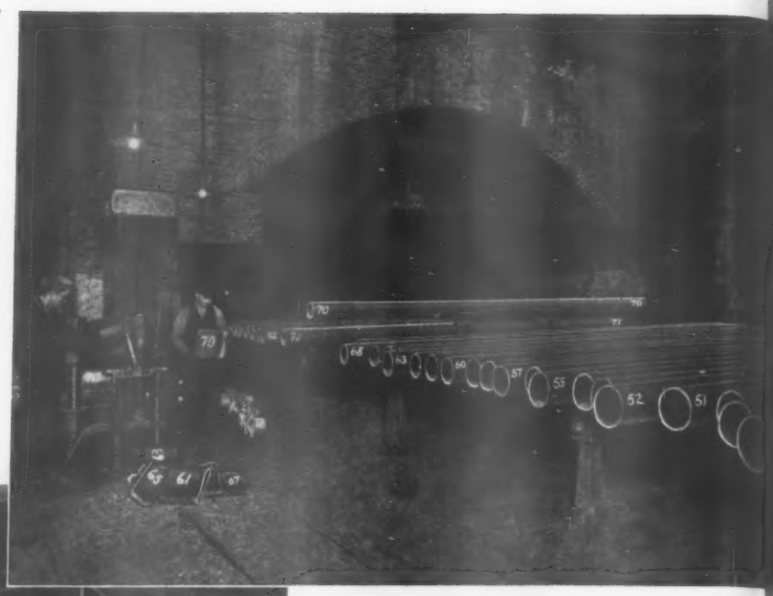
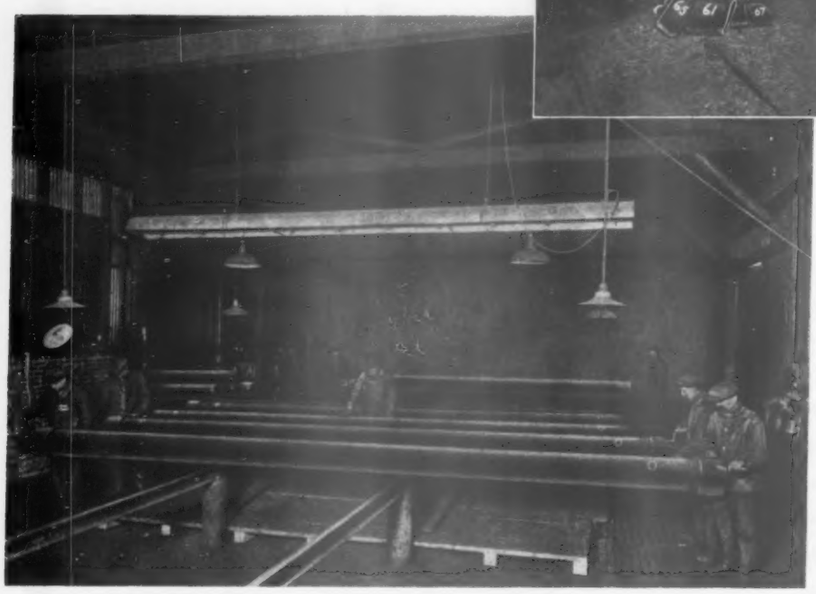
Eastern Distributors—Frick & Lindsay Co.

Instead of making one Crop-End Test on every few lengths, Chester makes two tests on every length, one on each end. Duplicate numbers are then compared—perfect lengths go to the oil fields—the others are scrapped.



Only after a length has successfully passed the weight test, drift test and sizing of thread tests, does it get an O. K. by Chester inspectors.



Some of the Reasons for

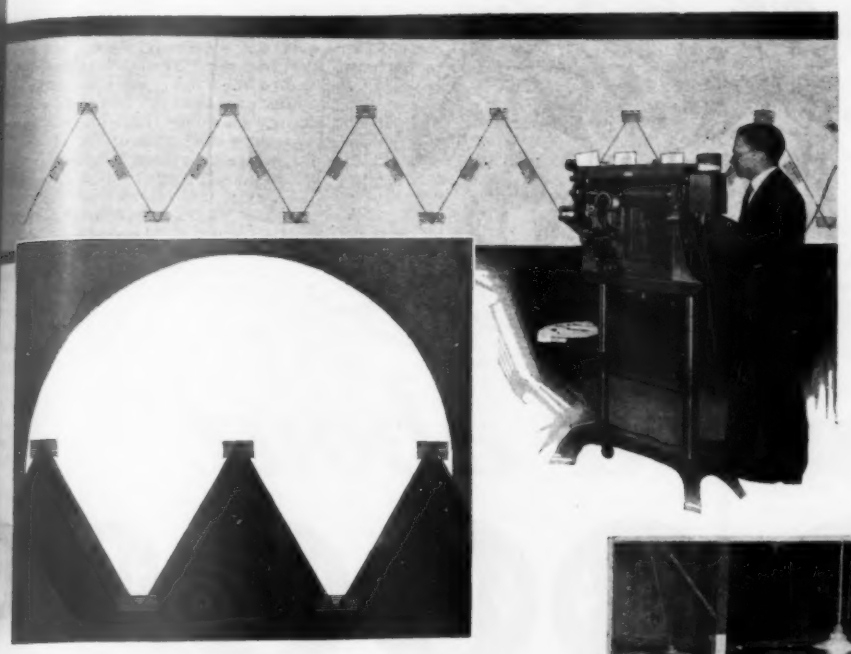
It is painstaking thoroughness in every detail of manufacture which has given Chester Casing, Pipe and Tubing such a good name *in the field*, where consistently dependable performance is best appreciated.

Every joint of 2″ line pipe to 12½″ casing made by Chester is as nearly perfect as modern machinery and long experienced workmen can make it. You may buy one trainload or ten trainloads of Chester Casing, Pipe or Tubing

CHESTER

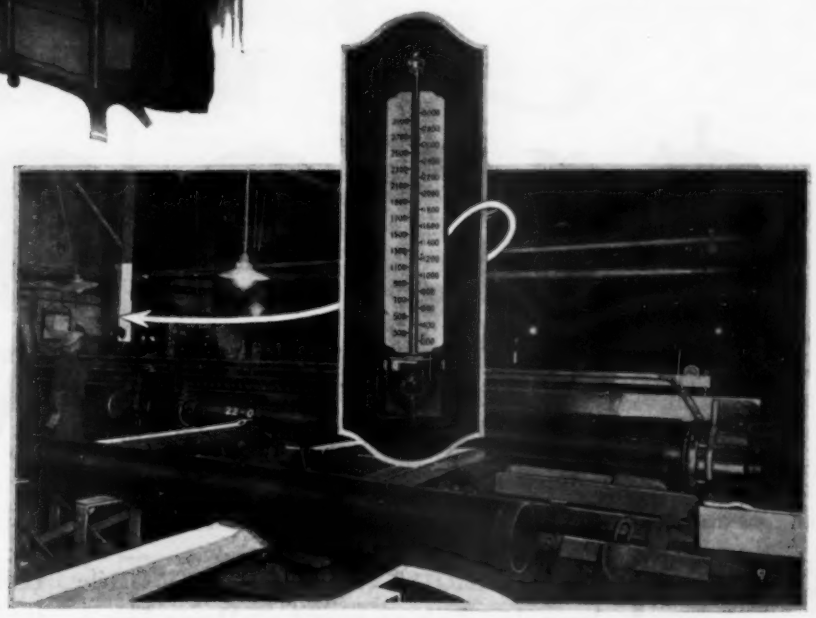
STEEL CASING

SPECIALISTS IN CASING FOR DEEP WELL DRILLING



This powerful projector throws on the screen an image of Chester threading magnified 200 times. Frequent comparison of thread samples with the chart keeps the threading uniform and accurate.

Knowing the unreliability of spring pressure gauges, Chester has installed mercury columns on its hydraulic testers so that there is no "guess work" as to the amount of pressure on each tube. This is just one of the many precautions which Chester takes to insure the utmost dependability.



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A word about

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The best way to get all the oil that's coming to you is to specify Kerotest—the world's standard drilling valve. Every Kerotest Heavy Duty Drilling Valve is certified by the Pittsburgh Testing Laboratory after the valve has been subjected to the famous Kerosene test under 2500 lbs. pressure.

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Always specify *Kerotest* and play safe

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per cent for mining or producing oil d 1 17/20 per cent for mining or pro-cing natural gas and 9/20 of 1 per nt for mining or producing other min-ls and lumber, and while other occu-tions are taxed none are taxed at a e in excess of 3/10 of 1 per cent, and ny at lesser rates. But besides these astic and explicit discriminations ainst the oil and gas interests, by fting the act to apply this percentage the proceeds of sale, whether the gas sold within or without the state, the ctical as well as the intended result, the case of producers having their own pipeline systems, is to make the tax, the case of natural gas, eight or ten nes greater than in the case of the min-g or producing of any other mineral cept oil.

"Let us go back for a few years and nce the history of the oil and gas in-stry briefly. To my mind it is the eatest of business romances. Let us gin at the beginning of oil and gas de-lopment in West Virginia and sketch htly its progress down through the ars.

Discovery of Gas

"We of the Great Kanawha Valley ke pride in the fact that the discovery d embryonic development began there. his was in 1805 1808 and it was in the cinity of Charleston, my home town and t today an important gas-producing ction of the state.

"They didn't go down for oil—those old oneers. When they drilled their first l and gas wells they were really after lt brines. The Ruffner brothers were tively engaged in salt making a few iles east of Charleston. As a conse-uence of drilling they invented rather rude casing, drilling tools, pumping ma-hinery and other implements. These ings were crude, but to these men can e directly traced the origin of virtually ll of the mechanical apparatus used to-ay in drilling oil and gas wells.

"When the Ruffners attempted to drill or salt brines, 10 miles above Charles-on, on the Great Kanawha River, they icked a spot in all innocence on the Warfield anticline. Unexpectedly they ound a large flow of natural gas. It was a useless curiosity to them for many years, but we are told that this gas was finally utilized by one William Tompkins in 1841 in the evaporation of salt brines, displacing the use of several hundred bushels of coal daily, as a fuel.

"We have the eminent authority of State Geologist I. C. White for much of the history of the development. He tells us that the real development of the state's oil and gas resources did not begin until the spring of 1860. The drillers really went down after oil that time. The well was sunk on the Rathbone tract, near Burning Springs, on the Little Kanawha River, in Wirt County.

"It was a considerable development, but misfortune overtook it in 1863, at the height of its development, when General Jones, at the head of two or three thousand Confederate soldiers, captured the whole works in one swoop, set fire to everything, destroyed buildings, derricks and several thousand barrels of oil and wrecked all the machinery. It was an act of warfare, done to circumvent the Federal troops.

Beginning of Production

"This put a damper on the oil business in West Virginia for several years except along the line of the Volcano anticline. But in 1888 Hart and Brockmeier, of Wheeling, went into it extensively on an island in the Ohio River, near Belmont, at the northern end of the Volcano anticline, where it passes into the state of Ohio.

"This Ohio River oil and gas development, together with the opening up of the Mannington oil and gas field in 1889, was the real beginning of the production of oil and gas in West Virginia on a large scale, the oil production reaching its peak in 1900 with 15,000,000 bbls., and the gas production reaching its high point in 1917 with a commercial production of nearly 309,000,000,000 feet. From these two high points, 1900 to 1917, oil and gas production in this state passed over the hill and began the long downward trail to the point of extinction that Doctor White has estimated will overtake our oil in 1981 and gas in 30 or 40 years.

"It is interesting to go back to the records and follow the trend of petroleum production. I will not burden you with a mass of figures, but will quote just enough to trace the course of production. The records were not at all accurate between the years of 1859 and 1876, but the total production for that period is estimated at 3,000,000 bbls. In 1876, 120,000 bbls. were produced in West Virginia. Production fluctuated until it dropped to 90,000 bbls. in 1884. From that point on, the advance was steady. There was a total production of 492,578 bbls. in 1890. Then production took a great leap forward with 2,406 218 bbls. in 1891. The peak, with 16,195,675 bbls., to be exact, was reached in 1900. From that time on there has been a slow but sure decline until the production in 1925 was 5,763,000 bbls.

"We are told that there is less than 180,000,000 bbls. left in the sands of this state. This, of course, is the estimate of recoverable oil. We know that a certain per cent of the oil is not recoverable under present methods of production. Perhaps the future may bring about the introduction of methods of getting this irrecoverable oil to the surface. Those of you who love to allow your imaginations to have full play at times may revel in this speculation.

Natural Gas Output

"The records of natural gas production are meager until 1906. In 1885 we learn that gas to the total value of $40,000 was sold in the state. The figures rose to $120 000 in 1887 and held to that total in 1888, but dropped after that, hitting the lowest point of $5,500 in 1890.

"Our first accurate record of total amount of gas sold was in 1906, when there were 119,400,392,000 feet sold. Steadily and consistently total sales climbed until 1917 when a total of 308,-617,101,000 feet was sold. The decline then began until the sales for 1921 were 167,227,696,000 feet. It has since risen, slowly reaching 175,786,952,000 feet in 1925. This gradual increase is not altogether the result of new production, but is largely accounted for by the fact that we have made greater withdrawals from existing wells to supply a steadily increasing number of domestic consumers.

"It is characteristic of human nature that we should start to conserve only when we finally become alarmed at the approach of total elimination of a commodity. But we can at least congratulate ourselves that we have not waited until the horse escaped before shutting the stable door. When we did start to conserve, we went about it in the right way and adopted no half-way measures. Testifying to this is the enlisting of the consuming public in this very conservation movement.

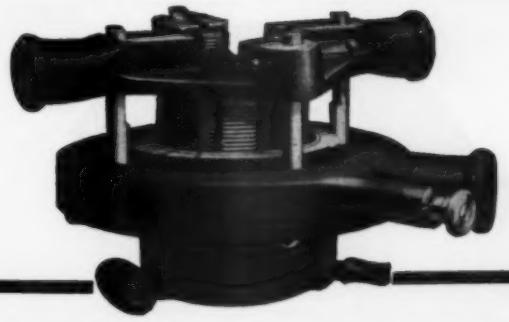
"It has been estimated by one authority that the producers themselves wasted more than 2,100,000,000,000 feet of gas in this State before they woke up to what they were doing. We all know of the wasteful methods of other years. Leaking gas lines, laid on top of the ground, sizzled away merrily while billions of feet of gas were turned loose into the air at the wells. For 20 years, from 1889 to 1909, the waste was unbridled. There were no meters for many years after we started to sell gas to the consumer. Municipalities lighted their streets with it, and the jets burned all day because there was nothing to save by hiring men to turn it out in the morning and light it again at night. Domestic consumers burned it day and night without stint, and manufacturers cared not how much was senselessly wasted.

"In this connection I want to say that we are under obligations to the Public Service Commission of West Virginia for the lasting benefit they bestowed upon the gas industry and the public when they made their wise ruling that all gas used or sold shall be metered.

Public Now Friendly

"A number of years ago a big business

(Continued on Page 325)



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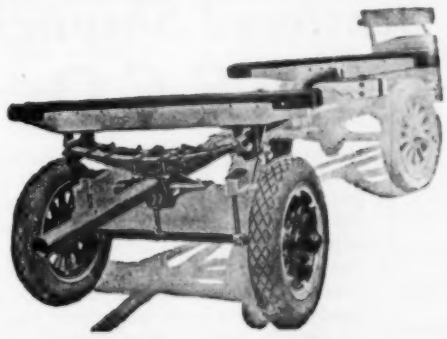

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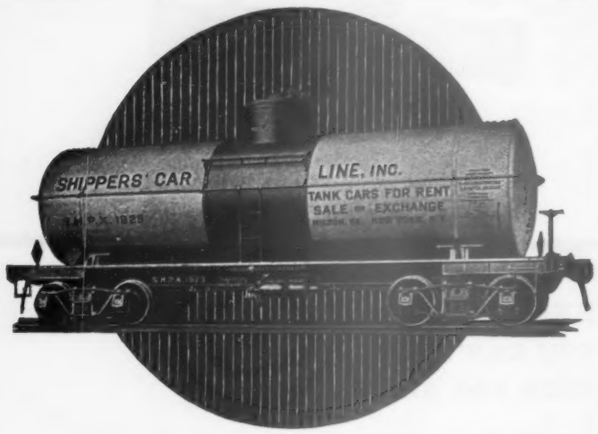

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Northrup Equipment Company
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Oil Well Supply Company stocks the complete line of

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Pumping Equipment

OIL AND GAS INDUSTRIES CONSUME SIX PER CENT OF COUNTRY'S STEEL

By B. E. V. Luty

PITTSBURGH, Pa., Oct. 2.—In 1926 the oil and natural gas industries are consuming fully 6 per cent of the steel made in the United States, the quantity being at least 2,000,000 gross tons. The estimate is not padded, as estimates of steel consumption by various industries sometimes are, by inclusion of a portion of the steel used by other activities serving the industry, such as the railroads. It includes merely steel used at and in oil and gas wells, line pipe, oil storage tanks and machinery used by wells, pipelines and refineries.

It may be estimated that there has been a doubling in this consumption in approximately 15 years. There are no early statistics to permit a close comparison. Statistics of production of oil country tubular goods at the pipe mills begin with 1913 and from that year to 1926 there is an increase of about 85 per cent. Statistics of oil storage tanks begin with 1923, while other lines of oil and gas consumption of steel must still be merely estimated.

In the official statistics of iron and steel production the production of welded tubular goods is divided into black standard, galvanized standard, oil country goods, O. D. and miscellaneous and boiler tubes. Black standard and galvanized standard represent the ordinary merchant pipe of every-day use. The designation "oil country goods" includes line pipe as well as casing, tubing, rotary drill pipe, etc. Production has been reported as follows, the writer appending an estimate for 1926:

Oil Country Goods—Gross Tons	
1913	841,089
1914	619,291
1915	602,920
1916	940,491
1917	887,903
1918	794,769
1919	1,068,914
1920	1,261,778
1921	891,995
1922	1,139,834
1923	1,358,889
1924	1,183,867
1925	1,018,302
1926	*1,550,000

*Estimated.

The production of all welded tubular goods in 1925 is given below, that year having stood second to 1923, statistically the record year, though there seems to be no doubt that this year will make a new record.

Welded Tubular Goods	Gross Tons
Black standard pipe	1,232,375
Galvanized standard pipe	548,567
Oil country goods	1,018,302
O. D. and miscellaneous	168,519
Boiler tubes	62,778
Total welded	3,030,541

Of the above total, 151,112 tons were wrought iron and 2,879,429 tons steel.

Production of seamless steel tubes has grown from 108,567 tons in 1913 to 568,190 tons in 1925. This material has been going into oil country goods quite extensively of late, particularly for rotary drilling. The cost has decreased relative to welded pipe and the vogue is likely to increase greatly.

The following figures on cast iron pipe production are in net tons of 2,000 pounds, while iron and steel statistics generally are in gross tons:

Cast Iron Pipe Production, 1925	Net Tons
Gas and water pipe	1,353,756
Gas and water fittings	60,496
Soil and plumbers' pipe	377,146
Soil and plumbers' fittings	133,337
Total cast iron	1,924,735

The Department of Commerce has been reporting the bookings in fabricated steel plate, beginning with the year 1923, by lines of consumption. The bookings in oil storage tanks and refinery materials and equipment have been as follows, in net tons of 2,000 pounds:

	Net Tons—Oil Tanks	Refinery
1923	296,128	17,114
1924	123,368	11,289
1925	87,541	24,964
1926*	140,000	28,000

*Approximate, based on returns for eight months.

Summary of Consumption

By comparing trade conditions this year with those in previous years for which there are definite production statistics of oil country tubular goods, this year's tonnage may be set at say 1,550,000 tons. The oil and gas fields also use some ordinary merchant pipe and a considerable tonnage of seamless material which can be estimated only roughly as there are no definite statistics for previous years to furnish a guide. Then there is machinery and other equipment at wells, pipelines and refineries, which can be estimated only roughly. Making all figures conservative, the total is approximately as follows, for steel consumption in the oil and gas industry from the well through the refineries:

Oil country goods, welded	1,550,000
Merchant pipe and seamless	150,000
Storage tanks	125,000
All other	175,000
Total	2,000,000

Line pipe for gas and oil lines being reported, in the production statistics merely as a part of "oil country goods" generally, there is no precise information as to line pipe consumption. Both the tonnage and the percentage have varied considerably from year to year, 1923 having been the year of heaviest line pipe demand. Some pipe mills have estimated the proportion of line pipe to total oil country goods in that year at 40 per cent, which would make about 550,000 gross tons. This year has been merely a fair one in line pipe, the heavy demand having been for casing and other well material. In fact, there might have been more line pipe contracted for had it not been that the mills were so busy that line pipe business was not particularly sought. Deliveries were difficult to arrange and mills would not make the price inducements they have sometimes made to get large line pipe orders to furnish an operation.

Pipe Making Progress

The earliest pipe was made of reeds with the pith pushed out. Later, logs were bored. Even in recent years water wells so equipped have been in use. Cast iron pipe came next, and has been in use in Europe for centuries. It is said that cast iron water mains in use for 75 years have been dug up and used again.

Wrought iron pipe came next and has been gradually but not entirely supplanted by steel pipe. The Bessemer steel making process was invented in the fifties and the regenerative furnace which made the open-hearth steel process feasible by furnishing the high heat necessary, at about the same time.

Alike in the manufacture of wrought iron, Bessemer steel or open-hearth steel, pig iron produced in the blast furnace is the primary material. It contains 4 to 5 per cent of carbon, the great bulk of which must be removed. Making wrought iron by the puddling furnace was a very laborious process. A great advantage of the Bessemer process was its speed. It became a tonnage proposition in a short time, while the open-hearth process was used chiefly in manufacture of fine steel.

The first extensive use of Bessemer steel was in the manufacture of rails. It was in 1877 that the production of steel rails first exceeded that of iron rails. About 10 years later it was found that steel could be welded, in the manufacture of pipe, the same as wrought iron, and steel then began to supplant wrought iron in pipe manufacture as it did in various other lines, so that before the end of the last century steel was the common material, wrought iron being a relatively minor product.

Later, open-hearth steel in turn made inroads on Bessemer steel, which had its largest production in 1906, 20 years ago. Bessemer steel is now a minor product. It retained its favor in pipe manufacture longer than in most other lines, on account of its threading better, but in recent years the threading qualities of open-hearth steel have been brought up to the requirements.

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Accurate Control with a

Yale Model 20B Electric Chain Hoist

The operator of this Yale Model 20B Ball Bearing Electric Chain Hoist starts the load instantly, either to raise or lower it, with a touch on the push button control, and can readily stop the movement within 1/16 inch of any desired position.

Accuracy, on this job at the Atlantic Wire Company's plant at Branford, is essential. The Yale Model 20B Electric Chain Hoist with push button control provides it. Yale Electric Chain Hoists are a standard part of the equipment furnished by the Bellis Heat Treating Company, builders of this installation for the special treatment of wire.

In the background is shown another type of Yale Electric Chain Hoist installation where the hoist is away from the heat, while the load chain is carried over two sheaves to the end of the jib.

Yale Ball-Bearing Electric Chain Hoists have the highest endorsement of users everywhere. Write for descriptive booklet.

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CULVERTS Culverts of ARMCO Ingot Iron resist t corrosive effect of running water, wit stand pressure, and last for years.

Other uses for ARMCO Ingot Iron are: Condenser boxe flumes, lath, pipe, run-down tanks, smoke stacks, wag tanks, wire. In all these products, ARMCO Ingot Iron hel reduce the ultimate production costs. The first cost is som times slightly higher. But its long service life means th the final costs are lower.

The reason is this: ARMCO Ingot Iron resists rust becau it is so pure. It is practically free from the rust-promotin impurities so common in ordinary iron and steel.

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ARMCO TRADE MARK INGOT IRON
The Purest Iron Made

WEST VIRGINIA OIL & GAS ASSOCIATION

(Continued from Page 319)

man of this country made an unfortunate remark—or it is attributed to him. The words he is said to have used were 'The Public Be Damned.' Yet out of that supposed occurrence grew a new order of things—a different attitude of producer toward consumer and a more friendly feeling of consumer for producer. Today we have big public service corporations all over the country with their first thought the comfort and pleasure of the public they serve. They know that the good will of the public is the most valuable asset they have and they strive first of all to get that good will then, all the time, to keep it.

"This changed attitude toward the public has served the gas people well in recent years. When we determined to adopt a more rigid policy of conservation through the education of the public along those lines we found that the consumer lent a ready ear. The public as a whole is fair. It does not demand that service be rendered them without adequate compensation. With the establishment of a growing public confidence we are finding less opposition to the establishing of higher rates and the consumer is fast coming around to our suggestions for more economical use of this fuel. Through a carefully prepared educational campaign we are showing the public that with higher rates and more conservation the consumer really saves money. Once he would have laughed at such a proposition. Now he stops to think, and, thinking, he learns. We are fast doing away with the false notions of an inexhaustible supply, low rates and waste which formerly prevailed.

Campaign of Education

"This campaign of education began when the producer and distributor of natural gas awoke from his long, comfortable sleep and realized that the supply was not going to last forever, with the consumers increasing and the gas fields being steadily drained. It was apparent that something drastic had to be done. There must be a more equitable distribution, and waste must be stopped if the consumer was to have the benefit of this almost perfect fuel for any considerable length of time. It was seen that failure to appreciate the value of natural gas was largely responsible for this. The consumer had come to look upon it as a permanent institution and the realization of its blessings had become lost because of years of familiarity. It was necessary to awaken him to a new realization of these things. Hence the educational campaign that is showing excellent results.

"Every one knows now that higher rates force economical use of gas and stop waste. This is proved by the fact that the revenue of distributing companies has not increased materially with higher rates, the consumer invariably using less gas in proportion to higher rates paid. Today the waste is comparatively low. It seems apparent, therefore, that had there been a policy of conservation three years ago, the life of the natural gas industry would have been prolonged for many years more and the public benefited proportionately.

"So let us carry on our policy of The Public Be Served. Let us foster this good will that is benefiting producer and consumer alike. Let us remember the little things that make for good feeling when we come in contact with the people who use our product. Let us feel that we owe to these people the most kindly consideration, not only because it is good business, but because it is man's greatest privilege to serve kindly and well."

LOUISIANA-ARKANSAS

(Continued from Page 50)

The well was completed last month at 2,045 feet as a 35-bbl. pumper.

Ouachita County

Humble Oil & Refining Co.'s No. 10 Hildebrant, Section 28-15-15, is pumping 150 bbls. of fluid, 42 per cent b.s., from sand at 2,591-96 feet. J. A. Reynolds' No. 3 Ratch & Cartier, Section 2-14-18, was dry and abandoned at 1,897 feet. Sure Oil Co.'s No. 4 Snyder, Section 34-15-15, was good for 250 bbls. on the pump from sand at 2,342-53 feet. In the Stephens district Ohio Oil Co.'s No. 5 T. Hall, Section 31-15-19, is a 32-bbl. pumper from sand at 2,153-73 feet.

Arrangements are being made to whipstock at 1,900 feet at W. H. Copenhaven's No. 2 Berg, Section 13-15-17. Six-inch casing was cemented at 2,368 feet at Gulf Refining Co.'s No. 12 Goodwin, Section 32-15-15; No. 22-A Umsted, same section, is drilling at 2,231 feet; No. 23-A is drilling at 2,003 feet. Eight and one-four h inch casing was cemented at 2,340 feet at Lion Oil & Refining Co.'s No. 5 Hays, Section 4-16-15. Magnolia company's No. 10 Goodwin, NE cor. Lot 2, NW, Section 5-16-15, is being rigged to deepen. It was completed last February at 2,530 feet as a 20,000,000-foot gasser. Six-inch was cemented at 2,277 feet at A. Meek's No. 3 Cawson, Section 35-15-17. Phillips company's old No. 16 Joyce, Section 33-15-15, is drilling at 2,626 feet and was formerly completed at 2,583 feet, making 30,000,000 feet of gas. Ten-inch was set at 40 feet at J. D. Reynolds' No. 3 Cramer, SE cor. SW SW, Section 22-15-16.

Roxana Petroleum Corp.'s No. 7 Berg, Section 28-15-15 is being bailed to test sand at 2,636-37 feet. Standard Oil Co.'s No. 12-B Murphy, SE cor. SW NW, Section 28-15-15, is a rig. Four and one-half inch casing was cemented at 2,781 feet at Standard Oil Co.'s No. 7-B Umsted, Section 32-15-15. Sun Oil Co.'s No. 7 Hardin, Section 27-15-16, is a rig. A. M. Sutton's No. 2 Schoolhouse, Section 28-15-16, is drilling at 250 feet. In the Stephens district, Magnolia Petroleum Co.'s No. 6 Watson, Section 31-15-19, is waiting for 6-inch to set at 2,140 feet. Ohio Oil Co.'s No. 4 Betty Hall, Section 31-15-19, is being rigged.

Columbia County

Gulf Refining Co.'s No. 1 Hughes, Section 31-17-22, is being rigged. Kentucky-Arkansas Petroleum Co.'s No. 1 Peter Doss, Section 29-19-20, has resumed drilling after several months of idleness and is drilling chalk rock at 2,480 feet.

Nevada County

For the third consecutive week the Nevada Pool has added a well to its list making better than 100 bbls. Humble Oil & Refining Co.'s No. 2-B Groves, Section 1-14-21, was completed in sand at 1,128-36 feet pumping 125 bbls. A derrick is up for Bemis and associates' No. 5 Ellis, C SE SE, Section 2-14-21. Humble company's No. 4 Bodeau, Section 10-14-21, is drilling broken lime at 3,009 feet. Humble company's No. 1 Womack, NW cor. Section 16-14-21, is drilling at 115 feet. A derrick pattern is on location for Ohio company's No. 1 McKinney, 210 feet north and 205 feet west, SE cor. W half SE NE, Section 9-14-21.

CO-OPERATION, NOT COERCION, IS NEEDED

(Continued from Page 31)

of the other owners of land above the field. But the right of the landowner which is so protected is, under the present rule of law, the right to reduce to possession the oil or gas that may come into his wells, either from his own land or from that of others, by measures declared to be, in the then state of the industry, proper and not wasteful. The right preserved by the police power, as at present declared, is that of private, competitive operation, not community operation nor a division of profits.

Serious Situation

If the efforts of petroleum engineers and lawyers be bent to legislation calling on the police power of the oil producing states to enforce unit operation, based on the right of various property owners to distributive shares of the oil produced on the land of one, instead of to a removal of restrictive laws which prevent the pooling of interests, a very serious

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For deeper pumping. Where, of necessity, light load on pull rods is needed. Long stroke. Polish rod moves in perfectly straight up and down movement. Fulcrum point not over 12 in. above floor—will not get out of line like those highly elevated. Only light concrete foundation required—lowest cost to install. Weight 1250 lbs.

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situation will confront the industry. And that this is not speculation is indicated in the cautiously worded suggestion that if the states do not act at once, the Federal Government will assume that duty. It is more probable that coercive measures will retard instead of accelerate co-operative methods, and it it is not impossible that demoralization will result.

One cannot say that because the right to drill on one's own land is a property right, therefore a law compelling unit operation is violative of the Fourteenth Amendment to the Federal Constitution. For the limit of the police power, like the power of equity, has never been defined, nor is it, under the present doctrines of the Supreme Court of the United States, capable of precise definition. Mr. Justice Holmes in the case of Noble State Bank vs. Haskell, construing the Oklahoma bank guaranty law, remarked that the police power extended to whatever was sanctioned by the prevailing public opinion, or preponderant public morality, and while admitting that the effect of the law was to take one's property for the benefit of another, it was held that this could be done in the interest of the public. And in view of the fact that in determining the validity of an act of a State Legislature, the Federal Supreme Court does not inquire into nor pass on its wisdom, one might hesitate to say that it would declare invalid a state law for unit operation and community division of oil or gas.

Facts Will Determine

The old limits of the police power were "public health, safety and morals." But in the last decade of the nineteenth century the words "public welfare" were added to the formula, and under the latter phrase no one may dogmatically set limits to this power. But under what has been called the "progressive liberalization of the Supreme Court, and its sociological interpretation" of the Constitution, a new condition has arisen. The valid exercise of the police power is determined, not by hard and fast rules of law, but by the concrete facts in each case. The Oregon minimum wage law (Muller vs. Oregon 208 U. S. 412) was argued by Louis D. Brandies rather from the practical than the legal standpoint, and his brief in a later case (Settler vs. O'Hara) on writ of error to the Supreme Court of Oregon, consisted of three pages of law and 390 pages of fact. Mr. Brandeis is now a member of the court.

Under the canons for determining the validity of state laws passed under the police power, if coercive measures are passed for unit operation, and if scientific rules are promulgated for flowing and operating wells by supervisory boards, the validity of and execution of the laws, and the operation of the rules will depend upon the facts as to each individual field. For the outstanding factor in the oil producing business is that no two fields are alike. In some there may be great amounts of gas in solution in the sand; in at least one recent field there was none; the wells were found to flow by water pressure. The porosity or hardness varies materially. The area of drainage of any one well cannot be computed with any degree of positiveness before actual operation. And no geologist or engineer, in the present state of scientific knowledge, will say that he can positively determine how much oil there is beneath any given trace, in advance of development, nor in fact whether there is any oil there at all. Nor can the limits of the field be so definitely determined. If those things were possible, the troubles of the oil industry would be over. For one might then bond his undeveloped lease, and borrow money on future production. And the oil, thus positively blocked out, might be drawn when and as needed. But no banker would accept that security today. And while it is not mentioned in the board's report, banking is as essneital a factor in developing new plans, as legal knowledge or engineering.

Diversity an Obstacle

Before the coercive power of the state can be applied to enforce unit operation in any given field, the actual facts as to the productivity of that field, its definite limits, the subsurface distribution of oil or gas, and the peculiar sand conditions that would affect its development and operation must be determined with reasonable certainty.

The geological investigations at Seminole County cannot determine whether one general structure underlies the whole area nor does the development work show whether there are three separate fields or three high spots on one structure. The completion of the wells now drilling will tell the story, not the estimates of engineers and geologists.

Unless conditions are fairly uniform, the operation of a law cannot be applied uniformly. This fact might not invalidate the law, but it would render necessary an examination of each field to which it is to be applied, to determine whether that field came under its provisions. The differences in the conditions in various recent fields should indicate the danger of applying a Procrustean rule. Unless the entire prospective field were owned by one person, either individual or corporate, the practical result would be the cessation of prospecting; for to present drilling costs would be added the burden of engineering and legal fees, the delay incident to judicial determination and on top of all the unending litigation with royalty owners on the various tracts of land above the geologic structure. Nor would the decision of a court in one case, necessarily serve as a precedent in another, for all would proceed upon the facts in each case.

Co-operation, Not Compulsion

The prime recommendation of the Oil Conservation Board is that the industry continue its exploration for new fields. If the law had in the beginning recognized the "right of the neighbor to so much of the oil as is withdrawn from underneath his property," it may well be doubted whether the oil fields of the United States would not now be in the virgin state in which they were left in the geologic ages of their formation. For it was only the certainty of a rule of law which gave to any prospector all the oil or gas that came into his wells, that developed the fields of Pennsylvania and New York, and induced the great migration to the Mid-Continent Field. Competitive drilling, with all its waste has made possible modern industry. The internal combustion engine, the lubrication of railroads, shipping and industrial machinery are possible because of the development of the oil fields. Prospecting, that made possible this development, is and always has been based on the hope of large returns by being the first to tap a virgin field. If community ownership of oil and gas had been the law of the industry, the great incentive would have been wanting. Prospecting is done by many individuals and companies that cannot finance the enormous operations which alone could have secured development of fields as units.

Co-operation in drilling programs will come with the advance of science and the removal of restrictive legislation. But a legislative program, under the police power of the states which would enforce a distribution of profits should not be imposed upon the oil producers, nor should it even receive attention until the Government is ready to reorganize all industry on a social instead of a competitive basis.

If a national emergency should exist, the Federal Government should expropriate the oil fields of the country, but that emergency would require it also to expropriate the steel mills, the ore deposits and the wheat elevators. And even then, it would be questionable whether a plan of operation should be suddenly imposed which runs counter to the basic law and practices on which the industry has developed.

CALIFORNIA FIELDS

(Continued from Page 58)

feet, the hole having been finished with a 6¼-inch oil string landed on bottom. This new well is pumping 152 bbls. of relatively clean 18.2 gravity oil daily. The Pan American is experiencing considerable difficulty with its No. 1 Chancorina, in the Rideout Heights section of the Whittier Field, due to a troublesome sand, and it will probably be another few weeks before this condition has been remedied. Neither the Pan American's No. 1 Broderick nor No. 1 Heights of the Petroleum Securities has picked up the deep sand expected to be encountered in this area, notwithstanding the fact that the former is already down 5,300 feet, while the latter has passed the 4,710-foot level.

Seal Beach

The Marland spudded in No. 4 Bixby at Seal Beach during the early part of the week and is now running three strings of tools in that area, two on the Bixby property and one on the Selover lease. The Standard has not yet spudded in its second well in this field but will probably do so within the next few weeks. The Associated has just concluded a deal with Mrs. Susana Bryant whereby it has acquired and will immediately develop a 40-acre tract in the extreme eastern part of the district. Work has already been undertaken but it will probably be several weeks before spud is made due to the necessity of building adequate roads and making other necessary preparations. It is generally believed that this property will be productive, although the wells may not be as large as might be desired. The Shell drilled quite a number of tests in this immediate area but the company was working too far south and east.

The Associated's new well is approximately 1,200 feet west of the Shell's No. 1 Bryant, which produced around 25 bbls. of oil and 1,200 bbls. of water from 4,620 feet for some time. The Shell's No. 2 Bryant, approximately 500 feet east of the same company's No. 1 Bryant, flowed about 50 bbls. of oil and 350 bbls. of water for some time before being abandoned. The Associated's new location is approximately 1,700 feet west of this well. The Shell's No. 1 Bixby was located about 1,000 feet south of the Associated's projected test, No. 1 Bryant and, although showings were logged at several points, the well was finally abandoned as a duster at 6,142 feet. The Shell's operations in the Seal Beach area indicate the breaks in the oil game very clearly and, although this company spent somewhere around $1,000,000 endeavoring to locate the productive area in this field, it was unsuccessful in doing so. Had the Shell located its No. 1 Bixby several hundred feet further north it would have succeeded in opening up the Seal Beach district. The company established quite a record for perseverance in testing this area and is not to be criticized in the least for pulling out, as other operators have also tried and failed, there being something like 12 dry holes drilled previous to the discovery.

It took the Shell's No. 12 Orange, in the Fullerton Field, about 10 days to get under way and, although it was a distinct disappointment when brought in last week doing 250 bbls. daily from 4,854 feet, it is now one of the best flowing wells in this area. The present production is slightly less than 850 bbls. a day, the oil being clean and testing 27.2 degrees. It is quite possible that the Shell will duplicate this well within the next two weeks as No. 13 on the same lease is in the oil sand and looking exceptionally promising at 4,960 feet. No. 11 Orange is also showing up well and this hole, together with No. 5 Pico at 4,430 feet, should be tanking oil within a short time. The Birch Oil Co. should also chalk up another producer in this field as its No. 1-A has been in the oil sand for the past 350 feet. The General Petroleum's No. 12 Tonner has not shown any improvement since being put on the beam two weeks ago at 4,993 feet and the failure to show up better is somewhat of a puzzle. It is still pumping about 25 bbls. daily.

Midway-Sunset

There were no particularly large wells finished in the Midway-Sunset Field during the past seven-day period and, with the exception of Hugh B. Evans' No. 7, in Section 4-32-23, there is little of terest to report in that area. This is listed as a 175-bbl. pumper from feet, the oil testing 25.8 degrees. Lewis has taken over the property holdings of the Beverly Oil Co. and ations in the future will be carried the name of the Lewis Petroleum The General Petroleum's No. 248-A Section 35-12-23 proved somewhat surprise when put on a production at 1,155 feet, as it came in flowing bbls. of salt water. No. 3 Bass of Standard, which is being carried for brown shale production in the M copa flats, is checking up uniformly other deep wells and production is ticipated around 5,200 feet.

The Union's No. 1 Sarrett, the well to be finished in the Mount Field, is holding up steadily on the at approximately 280 bbls. a day. move has yet been made toward put in a pipeline, but it is understood the Union is contemplating laying 8-inch from this field to Bakersfield distance of about 16 miles. The expects to finish its second producer this field some time during the week, as the shutoff on No. 2 Vedder 1,578 feet has been approved by the ing Bureau and drilling is being resu The Barnsdall spudded in two new during the week, No. 1 Vedder in Sec 8-27-28 and No. 1 Coffee in Section 28, and they will probably be ready production tests within 30 days.

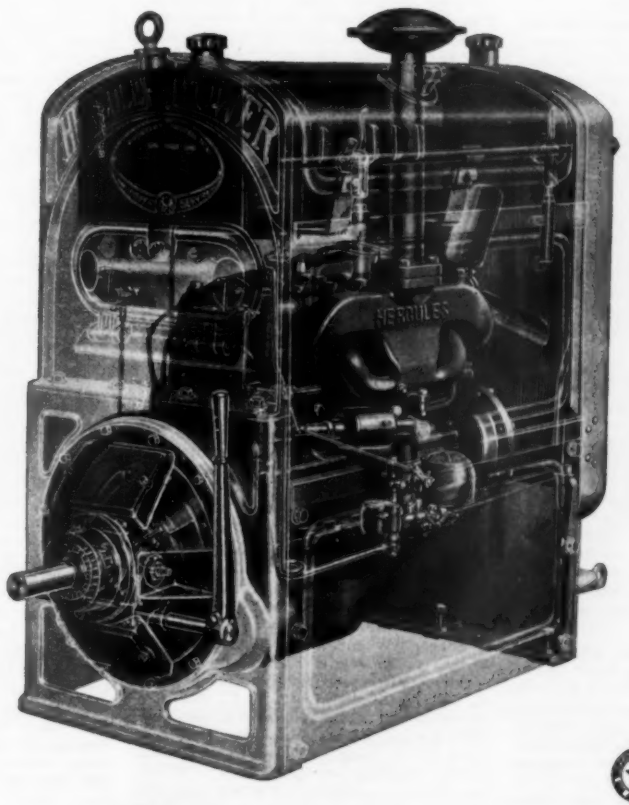
Southern California Wildcats

The Associated's No. 1 Cypress, in Inglewood quadrangle, Section 34-2-14 without doubt the most interesting cat drilling in southern California at present time, as it may be instrume in opening up a new field at this po The exact status of this test is unkn due to the fact that officials of the pany are quite reluctant to release information other than to say that looks rather interesting. Field sc brought in information several days that the company had picked up an sand and, while this has been parti confirmed, nothing definite will be kn of the well's potentiality until after production test has been concluded time within the next several days. fact that the Associated is landing string of 11-inch around the 3,800-f level indicates that the outlook is exc tionally favorable, although of course well is still in the wildcat class and remain so until commercial production secured. The area in which this well located has been punched full of holes several companies including the Uni Burnham Exploration Co., Marland Standard. Several of these holes w carried down below the 5,500-foot le one, the Standard's Potter & Smith w cat, being abandoned at 6,036 feet.

No. 1 Strong, of the Marine Oil Co a subsidiary of the Julian Petroleum, just passed the 5,130-foot level at B flower and due to the absence of up showings it has all the earmarks of duster. The Barnsdall has not yet sumed work on No. 1 Merlo at Puen which was suspended a week or ten d ago at 4,498 feet, and, while nothing d nite has been determined, it would be surprising if the hole was abandon in the near future. The Standard making preparations to land a string 10-inch in No. 1 University, a wild in the San Fernando Valley, at 4,209 fe but this pipe is being run in for prote tion purposes only and is not the res of showings of any kind. The Petr leum Securities' No. 1 Sesnon, near Z zah, in the San Fernando Valley, has shown any favorable indications to da and the outlook at 4,055 feet is rath discouraging.

The General Petroleum has staked location for its No. 1 Lomita at Sunse Beach, situated on property sublease from the Marland, and, although th former is not obliged to start work im mediately, it is understood that an ear test will be made. The General Petroleu and Marland holdings in this tract a checkerboarded in 50-acre parcels and th first well to be drilled by the former w be fairly close to the center of Sectio 19-5 11. This is midway between th

Simplicity
is strength



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Huntington Beach and Seal Beach Fields and is about 1 mile north of Standard's Lomita wells in the northern part of the former area, both of which encountered small oil showings. The Union recovered the fish which has been holding up progress in its El Segundo wildcat, No. 1 Howland, at 5,197 feet and should be in a position to resume drilling within the next few days.

No. 1 Van Nuys, of the Van Nuys Oil Co., a wildcat being sunk in the San Fernando Valley, was checked early this morning at 3,835 feet, and it is the intention to take a core tomorrow in order that any formation changes may be noted. No. 1 Johnson of the Smith Petroleum at Hawthorne is rotating ahead in a hard sand at 4,860 feet and unless some favorable indications are logged within a very short time the company will probably not succeed in opening up a new field at this point. The Union resumed drilling on its wildcat in the Newhall-Saugus area after an idleness of several weeks due to a fishing job which developed at 3,840 feet. The well is now down 4,010 feet in a brown shale streaked with gray sand. The Standard is making rather slow footage in its No. 1 Austin, a cable tool job up in Topango Canyon, and as a result the well is only down a little over 1,600 feet.

Northern California Wildcats

It is quite possible that the Bolsa Chica Oil Co. may succeed in opening up another field in California as soon as a test has been completed on its wildcat in the Kettleman Hills, Section 30-23-19. This hole is the best looking prospect in the northern part of the state at the present time and, although the company has not yet given out any official data, a trip to the well revealed the fact that it is capable of producing from 30 to 50 bbls. a day on steady production from 2,360 feet. It has pumped as high as 75 bbls. a day after allowing a head to build up. The oil is of a heavy grade, testing approximately 18 degrees in gravity and showing a cut of about 10 per cent. The company is at the present time making a thorough pumping test which will require the better part of another week. The outlook is quite favorable, especially in view of the fact that none of the other various holes drilled in the Kettleman Hills has succeeded in getting anything more than a minor showing.

The Standard Oil Co. has just about finished its structure survey work in the vicinity of Montalvo in Ventura County, where something like five or six post holes were put down during the past year in an effort to determine the structural conditions in that vicinity. The company has about 2,000 acres tied up and is expected to locate its first deep test within the next two or three weeks. The Standard is also doing some survey work near Camarillo in Ventura County, but this work has not yet been completed. The action of the company in leasing in this area aroused considerable interest several months ago, due to the prevalence of Serpentine outcrops not far from the company's holdings.

The Shell's Ventura County wildcat, No. 1 Berlywood, near Moorpark, is still on the doubtful list at 6,460 feet. Two other deep tests in Ventura County, the Chanslor-Canfield Midway Oil Co.'s No. 1 Hobson and the Milham Exploration Co.'s No. 1 Sexton, also look like eventual abandonments. Field reports indicate that the Federal Exploration Co. has found some very encouraging indications in its Tulare wildcat, No. 1 Kinsella in Section 15 22-24. The well is in a brown shale at 2,900 feet and, while the gas reported may be of petroleum origin, it will be recalled that marsh gas is quite prevalent in this area.

EAST CENTRAL TEXAS

(Continued from Page 58)

24 hours from sand at 2,815-23 feet. The same company's No. 10-A Rossen, Block 15, made 320 bbls. the first day at 2,825-32 feet, and No. 11-A Rossen, Block 14, started at 600 bbls. from sand at 2,825-32 feet.

Another Bazette Test?

The Bazette area is promised another test. Wetherill and others may start a well north of the town of Bazette, and that the big companies have not entirely lost hope in that up to now ill-fated territory which lies northeast of the Powell Field in Navarro County is shown by the fact that Wetherill is promised help by some of the nearby lease owners and is dealing with others.

Anderson County is now in the limelight because of a showing of oil and gas in the Humble Oil & Refining Co.'s test on Block 16, Anderson County School Land, Anderson Survey, at 2,557 feet. The company was setting pipe to drill deeper. If this proves to be oil country the Humble will be in rare luck as it owns most of the acreage in the district close to the test. The Navarro Oil Co. in the same county has drilled four tests on the Greenwood land on the Smullen Survey and in all of them the drill went into salt and the holes were abandoned. The same company's No. 5 Greenwood showed some oil at 2,003 feet but it tested dry and drilling was continued and at last reports the hole was below 2,240 feet in depth. M. A. Davey abandoned his test on the Jackson land, Erwin Survey, at 1,487 feet, reason not learned.

The four tests in Cherokee County being drilled by the Humble Oil & Refining Co., Nicholle and wife, Humphreys Corp. and the Magnolia Petroleum Co., are reported to be making progress. The Magnolia's test was last reported at 2,596 feet, drilling shale. It was the deepest of the four tests.

KANSAS FIELDS

(Continued from Page 46)

120 quarts, 615 bbls.; Phillips Petroleum Co.'s No. 1 Stewart, NW cor. NE, Section 13-27-7, dry and abandoned at 2,773 feet; same company's No. 1 F. W. Stewart, NE cor. NW, Section 13 27-7, sand at 2,680 96 feet, shot with 40 quarts, 180 bbls.; No. 2, NW cor. NE NW, sand at 2,645-68 feet, shot with 100 quarts. 331 bbls.

Prairie Oil & Gas Co.'s No. 1 Hotchkiss, NW cor. SW SE, Section 35-29-8, is a rig; Kismet & Sandford's No. 1 Layton, NW cor. SE, Section 7-28-5, is a rig; Empire Gas & Fuel Co.'s No. 18, Wallace, SW cor. NE NW, Section 11-28-4, rig; Allison & Fitzwilliams' No. 4 Kramer, SE cor. SW NW, Section 3-28-6, drilling at 480 feet; T. C. Johnson, spudding No. 3 Blakeman, NE cor. NW SW, Section 3-28-6; Magnolia Petroleum Co.'s No. 1 Riggs, SE cor. NE, Section 4-28-6, drilling at 1,050 feet; W. S. Hoyt's No. 1 Oldberry, SW cor. NE SE, Section 17-27-6, drilling at 700 feet; Phillips Petroleum Co.'s No. 1 Corn, SE cor. SW SW, Section 12-27-7, rig; White Eagle and others' No. 4 Stewart, NW cor. SE SW, Section 12-27-7, rig; Phillips Petroleum Co.'s No. 3 Stewart, NE cor. NW NW, Section 13-27-7, rig; Mid-Kansas Oil Co., spudding No. 3 Harris, SE cor. NW NW, Section 23-27-7; Nan Welch Co.'s No. 1 Williams, CSL SW NW, Section 11-26-4, drilling at 1,450 feet; Dickenson and others' No. 1 Richards, CSL SW NE, Section 24-26-4e, is drilling at 1,500 feet.

Greenwood County

Manhattan Oil Co. and Phillips Petroleum Co.'s No. 4 Freeman, SE cor. NE NE, Section 19-24-11, had sand at 1,811-37 feet, shot with 100 quarts and made 125 bbls.; Ward-McGinnis' No. 6 C Wiggins, NW cor. SE NW, sand at 1,787-1,812 feet, shot with 80 quarts, 175 bbls; Roth & Faurot and Manhattan Oil Co.'s No. 57 Thrall, SW cor. SE SW, Section 28-23-10, sand at 2,292-2,330 feet, shot with 50 quarts, made 25 bbls.; Empire Gas & Fuel Co.'s No. 5 Thrall, SW cor. Section 29-23-10, sand at 2,345-68 feet, shot with 100 quarts, 40 bbls.; Roth & Faurot and Manhattan Oil Co.'s No. 1 Wells, NW cor. NE, Section 33 23-10, dry and abandoned at 2,350 feet; Troxell and others' No. 1 Booth, SE cor. SW NE, Section 19-23-11e, dry and abandoned at 2,035 feet; Skelly Oil Co. and H. Gore's No. 1 Imthurn, SW cor. NE, Section 4-23-13, sand at 1,631-51 feet, shot with 100 quarts, 40 bbls.; Empire Gas & Fuel Co.'s No. 3 Jones, NW cor. SE, Section 6-22-10, sand at 2,251-80 feet, 25 bbls.; Sinclair Oil & Gas Co.'s No. 43 Browning, C SE SE, Section 19-22-10, had sand at 2,335-2,425 feet, shot with 10, 20 and 30 quarts, 120 bbls.; Skelly Oil Co.'s No. 1-C Prather, SW cor. NE, Section 20-22-10, dry and abandoned at 2,425 feet; Simmons & Darby's No. 3 Hampe, SW cor. SE NW, Section 18-22-11, had sand at 2,121-46 feet, shot with 60 quarts, made 50 bbls.; Simmons and The Texas Company's No. 4-C Fankhouser, NE cor. NW SW, Section 4-22-12, sand at 1,837-64 feet, 120 bbls.; Simmons and others' No. 1 Robinson, SW cor. SE NW, Section 20-22-12, dry and abandoned at 1,905 feet.

Ward-McGinnis' No. 1 Mock, NE cor. NE, Section 36-24-10, is drilling at 1,050 feet; Prairie Oil & Gas Co., spudding No. 2 Gaffney, SW cor. SE SE, Section 7-24-11; Paulhamus & Smith, spudding No. 1 Smith, SW cor. Section 8-24-11; Manhattan Oil Co.'s No. 1 Jacoby, NW cor. NW, Section 17-24-11, drilling at 680 feet; same company's No. 1 Gaffney, NE cor. Section 18-24-11, drilling at 415 feet; Robertson & Dugan's No. 1 Dugan, SW cor. NW NW, Section 20-24-11, rig; Ward-McGinnis' No. 2 Wiggins, NE cor. SW SW, Section 30-24-11, drilling at 800 feet; Theta Oil Co.'s No. 1 Rockhill, NW cor. NW, Section 31-24-11, drilling at 610 feet; Skelly Oil Co.'s No. 6 Green, SW cor. SE NE, Section 15-23-9, a rig; Marland Oil Co.'s No. 1 Edwards, SE cor. NW, Section 7-23-11, drilling at 300 feet; Simmons and Amerada Petroleum Corp., spudding No. 6 Tiffany, SE cor. SW SW, Section 9-23-11; Haverhill Petroleum Co.'s No. 13 Imthurn, CEL NE NE, Section 9 23-13, drilling at 400 feet; Mission Oil Co.'s No. 8 Schneider, SW cor. SE NW, Section 27-23-13, drilling at 1,000 feet; Manhattan Oil Co.'s No. 2 Sheppard, NE cor. SW SE, Section 2-22-10, drilling at 500 feet; Syndicate Oil Co., spudding No. 3 Bradfield, SW cor. SE SE, Section 2-22-10, and No. 4, SE cor. NE SE, is a rig; Empire Gas & Fuel Co.'s No. 12 Atyeo, NW cor. NE SW, Section 6-22-10, drilling at 1,070 feet; Phillips Petroleum Co.'s No. 3 Green, NW cor. NE NE, Section 11-22-10, drilling at 1,440 feet; Hazlett and others' No. 23 DeMalorie, NW cor. SE SE, Section 12-22-10, a rig; White Eagle Oil Co., rigging up No. 1 Yearout, SE cor. NE, Section 10-22 11; Empire Gas & Fuel Co.'s No. 13 Fromm, SE cor. NW, Section 14-22-11, drilling at 900 feet; same company's No. 6 Bartlett, CSL NE SE, Section 15-22-11, drilling at 1,375 feet; Simons and others' No. 11-B, NW cor. NE SE, Section 4-22-12, a rig; Simmons & Rhoades' No. 1 Ott, SE cor. SW, Section 29-22-13, is drilling at 625 feet.

Lyon County

Chris Sheedy and others' No. 1 Owens, SW cor. SE, Section 13-21-9, is dry and abandoned at 2,572 feet. McCullough and Independent Oil Co.'s No. 2 Bradfield, SW cor. NW NE, Section 25-21-10, had sand at 2,579-83 feet and swabbed 900 bbls. the first 24 hours. Leeward Petroleum Co.'s No. 1 Morris, SW cor. NE, Section 9-19 12, was dry and abandoned at 2,527 feet.

Transcontinental Oil Co.'s No. 10 Atyeo, SW cor. NE SW, Section 30-21-10, cementing 12-inch at 508 feet; same company's No. 8-A Atyeo, NW cor. SE NW, Section 31-21-10, is drilling at 500 feet; O. W. Culp and others are spudding No. 1 Kirkendoll, SW cor. SE, Section 25-19-10.

RECYCLING AIDS GASOLINE PLANTS

(Continued from Page 32)

tween 2½ and 3 miles from Comar's permanent plant No. 2. Comar also has another plant, No. 1, a short distance south of plant No. 2, from which some residue gas is pumped to the deep wells near the portable plant.

Plant No. 2 furnishes the bulk of the residue gas to operate the recycling system. This plant has a capacity of around 16,000,000 feet of gas daily but at present is running from 9,000,000 to 10,000,000 feet, and approximately a third of this is recycled gas returned to the plant from the wells 2½ miles distant. The remainder of the supply is fresh gas taken from adjoining wells on the lease.

From Deeper Wells

No attempt so far has been made to recycle the residue gas through the many by wells. These wells are from a shallower sand and the interest of the company has been centered only on the deeper wells which have dropped sharply in production. Because of the distance between the deep wells, where the gas lift is in operation, and the main plant, a portable plant, was set up on the site to save sending all the resaturated gas back to the original plant. In time gas lifts may be placed on the shallower wells near plant No. 2 and may boost the production there sufficiently to operate the plant at full capacity.

Out of the 9,000,000 to 10,000,000 feet of gas now being handled by plant No. 2 there is about 4,000,000 to 6,000,000 feet of residue. Except for some which is taken by an adjoining booster station owned by the Kay County Gas Co., this is pumped to the gas lifts.

This pumping is handled by eleven low compressors which force the gas the 2½ to 3 miles under a pressure of 30 pounds. The plant has two other recompressors but these are used in the operation of the plant itself.

The residue is received at the gas lifts at a pressure of around 10 pounds and there is driven directly into the wells by means of 16 compressors, which handle about 400,000 feet each daily. These compressors put the gas in the wells at a pressure of 350 pounds. At this pressure, the residue gas is driven down the tubing, through the sand and up through the casing and into a gas trap, one of which in the field is shown in an accompanying picture.

The traps used by the Comar Oil Co. are all of the type shown in the picture, being about 15 feet high and 4 feet in diameter, a sufficient size to handle the oil and gas from these wells. However, different makes or designs of traps are being used by other companies depending on the companies' preference. A trap is provided for each well. From these traps the gas is taken by vacuum to the plants, about 2,000,000 to 3,000,000 feet to the portable plant on the location and the remainder to the permanent plants.

Results of Operations

Some of the results of these operations are indicated in the fact that these deep wells which had declined in oil production to about 300 or 400 bbls. and in gas output to a total of only a few hundred thousand feet daily now are making as high as 2,000 to 2,500 bbls. of oil each and from 6,000,000 to 8,000,000 feet of gas. While all this gas is not net from 4,000,000 to 6,000,000 feet being residue, the dry residue gas from the plants becomes resaturated the same as fresh gas, thus boosting the natural gasoline output of the company.

Some interesting results in recycling residue gas are shown in a record kept by another large operator on its lease in a different field. This company used the residue gas from a 3,000 gallon plant amounting to approximately 380,000 feet. This gas was forced into a key well on the lease instead of into individual wells as did the Comar Oil Co.

Eleven producers, averaging 19 years of age each, were affected. The record kept showed that the pressure drive had been operated 12 months. The daily production of these wells totalled 310 bbls. as against 180 bbls. daily during the four months previous to the installation of the system. This was an increase of 39.7 per cent.

The gas production increased from 480,000 feet daily before the drive was put in operation to 900,000 feet daily now.

The operating pressure of this system was 38 pounds, the gas being forced into

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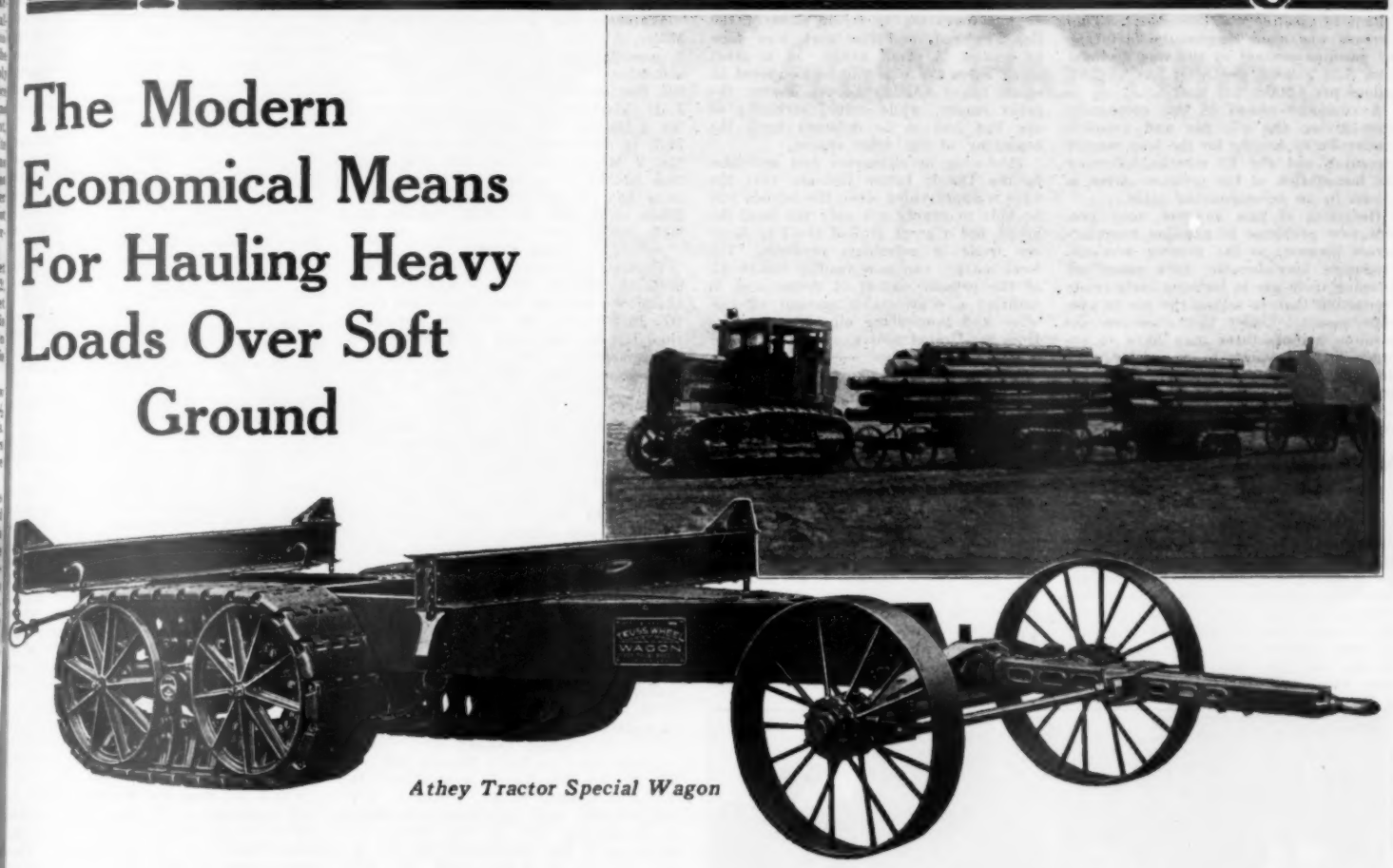

Athey Tractor Special Wagon

The Athey Truss Wheel All Steel Wagon is ideally adapted for hauling heavy loads over soft ground. It may be used behind tractors either singly or in trains or, by changing hitch, may be used with animals.

The Athey Truss Wheel is a track-laying wheel of special construction, ideally adapted as a load-carrying wheel for transporting heavy loads over ground that is soft, sandy or deeply covered with rotten vegetation. Nine square feet of ground contact provided by a pair of wide, rigid steel tracks, support capacity loads wherever animals or tractors can work.

The Steel Frame, the Wide Rigid Bunks, the Quick Operating Chock Blocks are some of the mechanical refinements that make Athey Wagons easy to load, unload and operate.

Athey Truss Wheel Wagons carry the minimum load under all operating conditions, operate with 30% to 50% less tractive power, reduce tractor operating and maintenance costs, eliminate operating delays, increase number of working days and carry capacity loads where other equipment cannot work.

Send for our new folders illustrating the many operating advantages of the Athey Wagons.

ATHEY TRUSS WHEEL COMPANY
130 No. Wells St., Chicago, U. S. A.
Cable Address: "Trusswheel, Chicago."
The Baldwin Locomotive Works, Foreign Representatives, Philadelphia, Pa.

ATHEY TRUSSWHEEL WAGON

IT BRIDGES THE SOFT SPOTS

the key well, which was 1,500 feet deep, and through the formation to the other wells on the lease, which were at an average distance of 1,750 feet from the key well.

The increase in gasoline production at the plant as a result of this process also is interesting. The pressure was applied on these wells the last of April, 1925. During that month, the total gasoline output of the plant was 47,600 gallons. The following April, after the system had been in operation a year, a total of 63,092 gallons of gasoline was turned out. This increase was made despite the fact that the gasoline content of the was declined from 3.33 gallons per 1,000 feet to 2.31 gallons per 1,000.

A complete record of this company's lease giving the oil, gas and gasoline production by months for the four months preceding and the 12 months following the installation of the pressure drive is shown in an accompanying table.

Recycling of gas, however, may present new problems to gasoline manufacturers because, as the process develops, producers may become more concerned in using their gas to increase their crude production than in selling the gas to gasoline plants. Under this condition the gasoline manufacturer may have to arrange his operations to co-operate with the producer to a greater extent than ever before, both to obtain wet gas for plant operation and to furnish the producing branch all the residue gas needed.

MODERN AMERICAN REFINERY AT SUMATRA

(Continued from Page 33)

white employes from Palembang to the site, work on housing for them was begun as promptly as possible. This housing was of a permanent nature, as it was later to be used by the operating force. The houses are of attractive design, being of brick covered with white stucco and having red tile roofs. Recreation facilities were also provided in the way of

Soengel Gerong site. Clearing trails in order to take levels of the ground.

concrete swimming pool and a commodious clubhouse equipped with piano, Victrola, radio, moving picture machine, etc. The swimming pool was necessary on account of the rivers being at all times full of silt and infested with crocodiles; also, in view of this condition, it was necessary to install a complete evaporating plant for providing fresh water for drinking and sanitary purposes.

A Healthy Site

In the construction of the refinery, the company has been particularly fortunate in there being an unusually small amount of sickness experienced. This is particularly remarkable when it is considered that the refinery was being constructed only a short distance from the equator under extremely tropical conditions by men who, in most cases, had never lived in the tropics. This condition was probably due to a large extent to the strict physical examination that the men were required to pass before being accepted for foreign service, and constant physical supervision by the local company doctor.

The crude to be run in the refinery will come from the company's producing property at Talang Akar, 70 miles southwest of Palembang. Details of the company's producing operations in the Dutch East Indies will be given in a subsequent article.

The company completed a 6-inch pipeline from the Talang Akar Field to Palembang on July 1 this year. The work of laying a pipeline was difficult, due to the fact that the greater part of it was through swamps, where dikes were built and the line buried in the dikes. It was necessary to string most of the line by hand, and the work was done by coolies in small gangs. In a great many cases the pipe had to be moved in small praus (Malay boats) during the rainy season, while actual stringing of the line had to be deferred until the beginning of the drier season.

Producing developments and activities in the Dutch Indies indicate that the time is approaching when the islands will be able to supply not only the local demand, but a great deal of the Far Eastern trade in petroleum products. The local market can now readily absorb all of the present output of crude, and in addition a considerable amount of gasoline and lubricating oils are imported from the United States.

OKLAHOMA FIELDS

(Continued from Page 46)

Corp.'s No. 1 Jackson, C SW SE, Section 11-7-8e, was shut in. It was a 9,000,000-foot gas well from sand at 2,956-83 feet.

Independent Oil & Gas Co.'s No. 5 Davis, SE cor. SW SE, Section 26-9-6, is drilling at 360 feet. Transcontinental Oil Co. and Independent Oil & Gas Co.'s No. 11 Harjo, C SE SE SW, Section 26-9-9, is drilling at 126 feet. Prairie Oil & Gas Co. is spudding No. 1 McAllister, SW cor. NE, Section 1-8 8. Independent and Atlantic Oil Producing Co.'s No. 4 Long, NW cor. SW NE, Section 32-8-8, is drilling at 990 feet.

Carter Oil Co.'s No. 1 Billy Street, NE cor. NW NE, Section 30-7-8, is cementing 15-inch casing at 54 feet.

Garfield Completions

Healdton Oil & Gas Co.'s No. 20 Belveal, SE cor. NW NE, Section 24-22-4w, Garfield County, had a bad fishing job at 2,345 feet, plugged back to sand at 1,889-1,916 feet and was dry. Sinclair Oil & Gas Co.'s No. 8 Kessner, C NE SE, Section 36-22-4w, drilled to 2,234 feet, plugged back to 2,232 feet, making 10 bbls. on the pump; Roxana Petroleum Corp.'s No. 8-H Schroeder, NE cor. SE, Section 18-22-3w, dry and abandoned; Summers Oil & Gas Co.'s No. 1 Vanderwork, NE cor. NW, Section 31-21-5w, rig standing. Tools and casing in hole, lease expired. Others have new lease. Sinclair Oil Co.'s No. 64 Walker, C SE NE, Section 13-22-4w, set 39 feet of surface pipe, drilling at 790 feet; No. 65, CSL NE NE, drilling at 800 feet and No. 66, SW cor. NE NE, and No. 67, NW cor. SE NE, locations; Healdton Oil & Gas Co.'s No. 34 Belveal, CSL NW NE, Section 24-22-4w, spudding; Sinclair Oil & Gas Co.'s No. 9 Kessner, NE cor. SE, Section 36-22-4w, location.

Pawnee County

Minnehoma Oil Co.'s No. 9 Wrightsman, NE cor. NW NE, Section 24-21-7, Pawnee County, had sand at 2,714-40 feet. It was shot with 10 and 20 quarts and made 20 bbls. initial production; Marland and Mid-Continent Petroleum Co.'s No. 1 School Land, NW cor. SE, Section 33-20-5, drilled to 3,730 feet, plugged back to 3,725 feet, shot with 50 quarts, started at 50 bbls.

Watchorn Oil & Gas Co.'s No. 16 Miller, SW cor. NE SW, Section 33-23-3, was drilling at 945 feet. Ed Reese and others' No. 1 School Land, NW cor. SE, Section 16-21-7, drilling at 860 feet; J. H. Markham, Jr., is repairing rig on No. 2 Bailey, CEL NE NE, Section 23-21-7, to drill deeper. Marland Oil Co.'s No. 2 Miner, NW cor. NE NW, Section 33-20-5, is a location. Same company has rig on ground for No. 3 McCibus, NW cor. SE NW, Section 33-20-5.

Creek County

Register Oil Co.'s No. 2 Murrell, CSL SW NE, Section 17-19-9, was dry and abandoned at 3,420 feet; Gypsy Oil Co.'s No. 13 Richard, SW cor. NE NW, Section 1-18-11, had sand at 2,086-88 feet and started at 460 bbls.; Sunray Oil Co.'s No. 8 Sango, SE cor. NW, Section 6-18-12, sand at 1,974-99 feet, 125 bbls. naturally, shot with 30 quarts, did not help; Savoy Oil Co.'s No. 7 Johnson, NE cor. NW SE, Section 22-17-8, sand at 2,768-74 feet, made 15 bbls.; McCullough Oil Co.'s No. 1 Ta-Con-Fah, CSL SW SE, Section 13-17-10, sand at 2,474-90 feet, 15 bbls. naturally; Kirchner and others' No. 3-A Ko-Co-Con-Nay, CEL NE SE, Section 23-17-10, dry and abandoned at 2,466 feet; Pioneer Oil Co.'s No. 9 Bucktrot, CEL NW NE, Section 24-17-10, sand at 2,460-68 feet, 15 bbls.; C. M. Ireland's No. 8 Freeman, SE cor. SE, Section 8-17-11, sand at 2,542-65 feet, shot with 40 quarts, 250 bbls.; Misner & Reesman's No. 1 Broadnox, NW cor. Section 16-17-11, sand at 2,595-2,622 feet, shot with 10 quarts, 310 bbls.

Grady County

Carter Oil Co.'s No. 1 Horton, NE cor. SE, Section 8-3n-5w, is a location. In the same section iis No. 1 Ridley, NW cor. NE SW, is a rig. Briscoe & Hall's No. 3 Nations, NW cor. SE, Section 34-3n-5w, is a rig. Carter Oil Co. is rigging up No. 3 Wham, SW cor. NE, Section 34-3n-5w. McBride and others' No. 2 Mitchell, SE cor. NE SW, Section 34-3n-5w, is a location. Carter Oil Co. is rigging up No. 1 Cross, NE cor. NW SW, Section 35-3n-5w. Humble Oil & Refining Co.'s No. 1 Cline, SW cor. SE, Section 27-6n-5w, is drilling at 1,023 feet. Gypsy Oil Co.'s No. 34 Seay, CNL NW SE, Section 33-6n-5w, is a rig.

Garvin County

Iowa Oil & Refining Co.'s No. 3 Watkins, SE cor. NE SE, Section 7-2n-3w, had sand at 2,627-77 feet, made 105 bbls. the first 24 hours; Carter Oil Co.'s No. 2 Pierce, SW cor. Section 8-2n-2w, shut in for 55,000,000 feet of gas from sand at 1,935-40 feet; Humble Oil & Refining Co.'s No. 5 Jordon, NW cor. NE NW, Section 19-1n-3w, sand at 3,302-07 feet, 880 bbls.; Magnolia Petroleum Co.'s No. 3 Newstadt, SW cor. SE, Section 34-1n-3w, sand at 3,030-47 feet, 50 bbls.

Humble Oil & Refining Co.'s No. 1 Lyles, SW cor. NW SW, Section 2-2n-3w, is a rig. Magnolia Petroleum Co.'s No. 2 Dolmon, NW cor. SW NW, Section 2-2n-3w, rig; same company's No. 3 Adams, NE cor. SE, Section 3-2n-3w, drilling at 152 feet; Mid-Continent Petroleum Corp.'s No. 2 Runnels, NW cor. NE SW, Section 3-2n-3w, drilling at 250 feet; Magnolia Petroleum Co.'s No. 5 Lahman, NW cor. SW NW, Section 23-2n-3w, drilling at 112 feet; same company's No. 2 Novle, C SW SW SE, Section 10-2n-2w, drilling at 120 feet.

Stephens County

Magnolia Petroleum Co.'s No. 11 Bartley, CWL SE NW, Section 20-1n-8w, had sand at 2,313-26 feet. It is pumping 2 bbls.

Pierce & Brown's No. 1 McWilliams, SW cor. NW SW, Section 26-1n-8w, rigging up rotary; Guy Brown & M Alester's No. 5 Voss, SE cor. SW, S tion 28-1n-8w, drilling at 50 feet; C & Beard's No. 2 Skelly-Brigham, C SW SW, Section 30-1n-8w, drilling 1,986 feet.

PRODUCTION OF OIL BEGUN IN SHALE PLAN

The Bureau of Mines of the Depa ment of Commerce announces that actu production of oil from Colorado shal has begun at the new experimental pla of the Bureau of Mines, near Rulis Colo. Investigations of the treatment oil shales have been conducted by t Bureau of Mines over ten years, in operation with the states of Utah a Colorado. At the suggestion of the co mittee appointed by the President determine the possibilities of a fu supply of oil for the Navy, Congress a propriated $90,000 to the Bureau Mines in March, 1925, for the constru tion and operation of a pilot oil sha plant and the purchase and mining shale. The site selected for the pla is 1½ miles southwest of Rulison, Garfield County, Colorado, on Naval shale reserve No. 3. A 3-mile trail fro the plant site to the mine site and a ro from Rulison to the plant were co structed. An aerial tram line is bei erected from the mine to the plant. T General Land Office co-operated by ma ing a survey for the water supply lin The town of Rifle, 13 miles from th plant, has donated the use of an offic in its high school building. Several pla buildings have been constructed, and th work of installing equipment is practi cally completed. The plant includes Pumpherston oil shale retort purchase in Scotland, an American type retor scrubbers, condensers, gas producer, wate tank, boilers, crushers, a laboratory, an other equipment. The Scotch type of re tort was recently placed in operation an the American type retort will probably b started in the early part of October.

M. J. Gavin, refining engineer of th Bureau of Mines, exhibited a bottle of th first crude oil to a convention of oil an mining men at Denver, Colo.

Crude oil from the Scottish retort, h said, congealed at 70 degrees Fahrenhei due to 10 to 12 per cent wax conten Flow lines froze at 68 degrees. Ther was a large residue of sulphate of am monia, approximately 60 per cent of r covered products. Since the retort is o full commercial size, costs as determine by operation can be converted to commer cial costs without difficulty.

The Scotch retort is a continuous proc ess, ore being externally heated, and o undergoing a secondary decompositio which leaves it in a condition to go direc to the refinery. The N-T-U is a batc process, the retort having to be empti and refilled when distillation is com pleted; the heat comes into direct contac with the shale. Quality of oil recovere is different and is not suitable for th refinery, until further treatment in o ordinary cooking still.

The most important operating item wi be cost of mining. Many estimates hav been made, but actual operations will b required to determine the facts. Presen plans call for benching part of the s carpment in Naval Reserve No. 2 fro which it goes by tram, 2,175 feet abo the plant.

MOTOR GROWTH IN CANADA

Alfred Reeves, general manager of th National Automobile Chamber of Com merce, in Detroit on his way to tour th principal cities of Canada, says: "Unles there is a decided change in retail sal it is reasonable to expect total motor c output for 1926 will be at least 200,0 better than the 1925 record, or in exce of 4,500,000 units. Canada has a mot future surpassed by no other country the world. It is on the threshold of much extended automobile growth an will double its registration within a sho time."

He Expects Unusual Service from Harrisburg

And why not? What other kind of service would you expect from a coupling that is Forged Seamless from special Oil Field Steel without a weld or a weakness?

Unusual service is made possible by the double strength of Harrisburg Couplings and insured by accurate threads, perfect taper, and a uniformity of size and temper that eliminates all question of stripping or galling.

Put Harrisburg Couplings on your drill pipe, tubing and casing, and go down after it with assurance that coupling troubles will never again interfere with your records for speedy and economical drilling.

Stocked and Sold by Leading Supply Houses

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HARRISBURG

Forged Seamless Steel Couplings

One Ranney Method of Mining Shown in Actual Operation

In the accompanying sketch an effort is made to visualize the actual operation of one form of the Ranney method of mining oil. Approximately 100 different modifications of this mining method are available for use under different conditions found in the various oil fields. A shaft is shown passing downward from the surface of the ground clear through the oil-bearing sand, all oil, gas, air and water being sealed out of this shaft by means of a concrete lining. When a shaft has reached a point 10 or 15 feet below the oil sand, tunnels 7 feet high are dug outward from the bottom of the shaft, these tunnels surrounding each 40 acres of the oil property to be mined. Small mine wells are driven upward through the roof of each tunnel and tap the oil sand from below.

In this picture a drainage cavity in the bottom of the oil sand, approximately the size of a barrel, is shown at each little mine well. Each drainage cavity furnishes a large surface of exposed sand from which the oil flows into the piping system of the mine. As oil is removed from the bottom of the sand by gravity aided by vacuum, compressed air or gas is forced into the top of the oil-bearing stratum. Thus suction is applied below the oil and pressure is applied above to drive it from the sand.

Pressure Restored

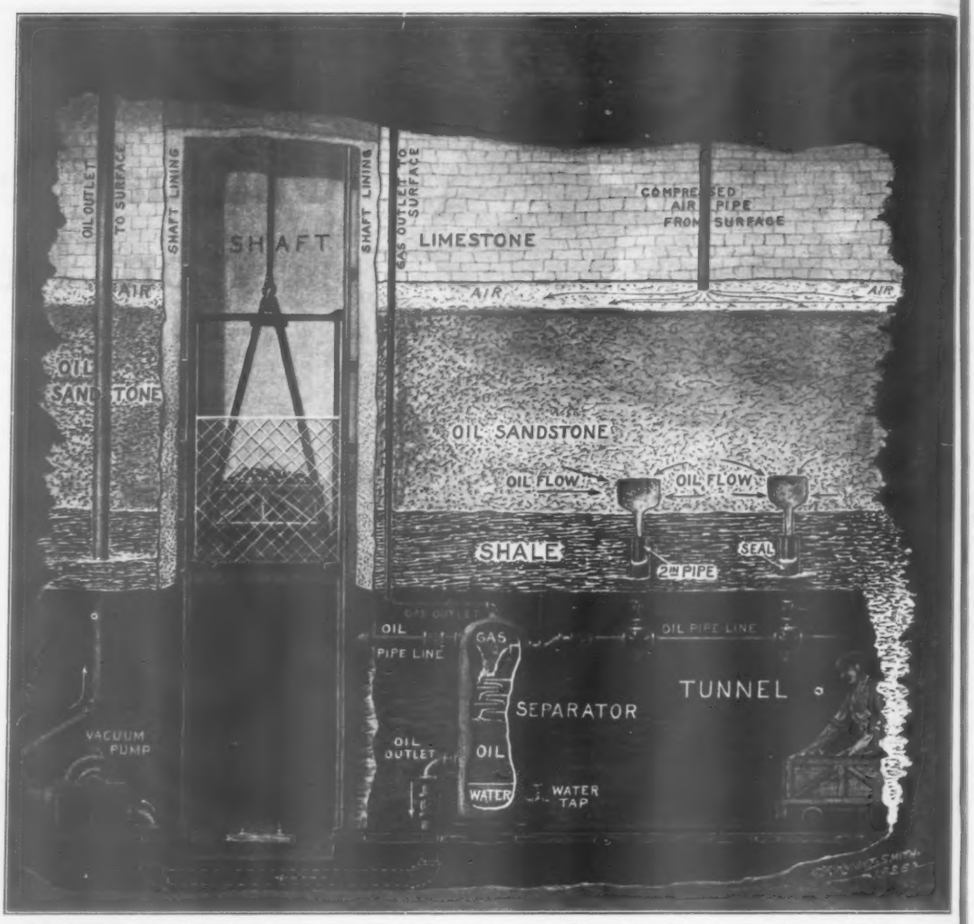
At first the pressure from above is small, but later it may be increased until the original pressure of the oil field has been restored. The air or gas so applied is forced into the top of the oil sand at the center of each 40-acre unit while the mine wells are driven upward into the bottom of the sand at intervals of 10 feet around the edge thereof. In this way 528 drainage cavities and mine wells are provided to drain each 40 acres of oil sand. While the oil-bearing stratum is usually mentioned as a "sand," it should be noted in particular that in most oil fields this so-called "sand" is really a sandstone, in which drainage cavities will not cave. But where the sand is unconsolidated the mine wells are lined with a screen to prevent the escape of loose sand.

In the picture a pipe is shown sealed in the mouth of each mine well and is connected with the main pipeline in the tunnel, through which oil, gas and any small quantities of water are drawn by vacuum and gravity into a separator, which divides gas, oil and water from each other. Then each one of these three materials is pumped separately to the surface of the ground. The oil passes into storage tanks; but all the gas is saved and conducted to the casinghead gasoline plant, where the gasoline is extracted. It should be noted that the flow from each mine well is controlled by a valve and that the pipeline in each tunnel is also controlled by a valve. In this way positive control is had of the entire system and individual control of the smallest unit in it.

The man shown in the tunnel is bringing a small carload of rock to the shaft where it will be hoisted to the surface of the ground. This loose rock is taken from the face of tunnels that are being driven ahead. Additional mine wells are installed as the tunnel advances, but none within 100 feet of the working face of any tunnel.

Handling of Water

Should a quantity of water be found in the bottom of the oil sand the pipe in each mine well would be carried above the water level so that only oil would be pumped. However, when there is a great pressure of water the tunnels are driven above the oil sand and the little mine wells are placed in the floor of the tunnel. The rising water then lifts oil up into the piping system. In this way practically no salt water is removed from the ground, which greatly reduces the cost of oil production. The process takes advantage of the forces of nature wherever found, instead of trying to combat these forces. The gas or air pumped into the sand rides above the oil, and the oil, being lighter than water, floats on the water in the sand. The downward pressure of injected air and the upward pressure of water present both combine to assist gravity in driving the oil out.



No gas, oil or water is to be found in the tunnel, since an impervious rock is almost always encountered both above and below an oil-bearing sand, otherwise the oil would have escaped ages ago. However, a very complete ventilation system and all known measures are provided for the safety of the men. Only concrete and steel are used in timbering the shaft. Neither the ventilating system nor air shafts are shown, since these are old in the art of mining.

It should be noted that only one large main pump is necessary to pump the oil from almost an unlimited number of mine wells. This pump is several times more efficient than any oil pump inserted into wells drilled from the surface. In fact the cost of pumping oil from oil mines is estimated as probably less than one-fourth of the cost where wells from the surface are pumped individually.

It is estimated by engineers that the Ranney process may recover from abandoned oil fields from two to four times as much oil as has already been produced by wells at a total installation and lifting cost of from 15 to 35 cents per barrel of oil so saved.

CHANGE REGULATIONS ON U. S. OIL PERMITS

The Department of the Interior through the General Land Office has just announced orally the promulgation of an amendment to Section 8 of the regulations concerning oil and gas permits, under the Act of February 25, 1920, relating to leases as a reward for discovery of oil or gas.

As amended Section 8, which is embodied in Circular No. 1,094, reads as follows:

"8. Reward for Discovery—Upon establishing to the satisfaction of the Secretary of the Interior that compliance has been made with the terms and conditions of the permit and the operating regulations applicable thereto and that valuable deposits of oil or gas have been discovered within the limits of the land embraced in the permit, within the period of the permit or extension thereof, the permittee is entitled (a) to a lease of one-fourth of the land included in the permit, on a royalty of 5 per cent, or for at least 160 acres if there be that area in the permit; (b) to a preference right to a lease for the remainder of the land covered by his permit at such royalty as may be fixed by the Secretary of the Interior, not less than 12½ per cent in amount or value of the production, nor more than the royalties fixed for leases under Section 18 of the act (Sec. 19, par. c of these regulations), except that on that portion of the average production exceeding 200 bbls. per day per well for the calendar month, the royalties shall be 33⅓ per cent for oil of 30 degrees Baume or over and 25 per cent for oil of less than 30 degrees Baume. Application for lease based on a claim of discovery of oil or gas within the limits of land embraced in a permit should set forth in detail the operations that have been conducted and the amount and value of the discovery claimed to have been made; and must include a certificate by the officer of the department empowered to supervise operations under the permit to the effect that the permittee has conducted his prospecting operations in accordance with approved methods and practice and has made satisfactory compliance with the operating regulations; that each and every well drilled on the permit area is in a satisfactory condition, and that the well or wells relied upon for evidence of discovery have been put in condition for operation and thereafter tested adequately for productive capacity."

Princeton to Begin Petroleum Research Under A. P. I. Fund

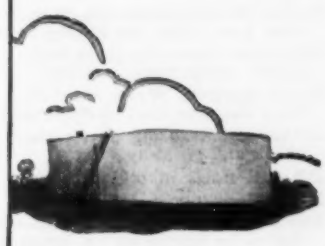
PRINCETON, N. J., Oct. 2—Arrangements have been completed by which investigations into the chemistry of petroleum are revealed by catalytic studies will be undertaken in the laboratory of physical chemistry under the supervision of Prof. Hugh S. Taylor of Princeton University.

Professor Taylor said that the work will be done at the request of the Central Petroleum Committee of the National Research Council, acting in an advisory capacity to the American Petroleum Institute in the administration of the petroleum research fund founded by the gift of $250,000 from John D. Rockefeller and a similar gift from Universal Oil Products Co.

"It is hoped that by the studies in question new points will be developed with regard to the structure and stability of the component parts of petroleum, which will pave the way for a definite attack on the problem of better utilization of petroleum products," Professor Taylor said.

The work at Princeton University is in charge of Prof. Robert N. Pease, who has been in charge of the chemical department in the University of Virginia. Professor Pease has been appointed research associate in the department of chemistry here, with the rank of assistant professor.

What paint for metal equipment?



53 oil men give their decision

OIL men say "red-lead" when asked what paint they use for protecting metal equipment against corrosion. This fact was recently established by a questionnaire sent by a prominent oil publication to a representative group of men in the oil industry.

Of the 53 who replied, 32—*three out of every five*—said they use, specify or recommend pure red-lead. And these men are responsible for the protection of millions of dollars' worth of metal equipment. They represent every oil field in the country. In view of the many paints now on the market their agreement is remarkable.

Engineers and gas men also agree

A similar questionnaire was answered by several hundred engineers and gas men. The engineers represent every branch of the profession. Yet 86% of them favor red-lead. The agreement of the gas men was equally convincing. 81% of this group endorse red-lead. And these gas men represent forty-two states, ranging in climate from the damp east to dry Nevada and Utah. This survey conclusively proves that wherever there is a question of metal surface protection, pure red-lead is the accepted method used.

The highest grade red-lead obtainable is Dutch Boy red-lead. You can get it in either paste or liquid form. The liquid comes in the natural orange-red for next-to-metal coats, and also in browns, greens, and black for finishing coats. The paste may be obtained in the natural orange-red and may be shaded to any desired dark color.

For light finishing coats

Dutch Boy white-lead on top of an undercoating of Dutch Boy red-lead will give you a light finishing coat that reduces heat-absorption and decreases oil-evaporation. Like Dutch Boy red-lead, Dutch Boy white-lead has the properties that enable it to resist the attacks of rust-forming elements.

Specialists in our Department of Technical Service have made an exhaustive study of paint protection for metal. They will be glad to give you whatever help you may require. Address them in care of our nearest branch.

Dutch Boy Red-Lead

For oil-refining you want litharge of correct physical character and extreme chemical purity. Such litharge is made by the makers of Dutch Boy red-lead and Dutch Boy white-lead. At all times you can rely on its unvarying uniformity. Our nearest warehouse can give you quick shipment in any quantity you desire.

NATIONAL LEAD COMPANY

New York, 111 Broadway — Boston, 131 State Street
Buffalo, 116 Oak Street — Chicago, 900 West 18th Street
Cincinnati, 659 Freeman Ave. — Cleveland, 820 W. Superior Ave.
St. Louis, 722 Chestnut St. — San Francisco, 485 California St.
Pittsburgh, National Lead & Oil Co. of Pa., 316 Fourth Avenue
Philadelphia, John T. Lewis & Bros. Co., 437 Chestnut Street

Mebby So

White man comes makem rig up on hill and starts to dig.
Injun watchem white man toil—
Think heem driller heap big fool
Sets all day on a pine stool.
Toolie swingem heap big wrench then goes sleep on greasy bench.
Nite time comes, no go to bed nother outfit come instead.
Never stoppem. Work like hell; thats the way they drillem well.
Driller get heap big pay, cashem check and go away.
Oil still flows in big steel tank,
Me gottem money in the bank,
Buy a car and come down road—turn out to let bridge go by, break him quick.
Leave the dam thing in the crick.
Buy two more and mebby three, one for squaw and two for me.
Buy papoose a pair of shoes, spend whats left on wildcat booze.
Have good time but go to jail, good friend comes and goesum bail.
Banker says my money gone, heap big fool—
Bye and bye some more come on.
That's the way the oil game goes.
White man getsum, Injun blowsem.
Me think driller heap dam fool, sets all day on old pine stool.

Mebby So—but no driller has ever been made a fool of by a Shaffer Gauge Cock, they swear by them—not at them. Nowhere will you get more value for your money, get a set today at your supply store and save your cussing for something else that needs it—your Shaffer Gauges won't.

J. E. SHAFFER CO.
316 Mid-Continent Bldg.
Tulsa, Oklahoma

Price $2.25
All Parts Are Interchangeable

Made in two sizes, ½ or ¾-inch Furnished with combination fibre wheels or a special all-metal wheel for strong alkali water. Extra wheels 25c each.

SHAFFER
The Standard Boiler
Gauge Cock

MANY OSAGE TRACTS PASSED UP BUT SALE BROUGHT $2,117,300

The outstanding feature of the Osage lease sale held on Thursday, September 30, at Pawhuska, Okla., was the purchase by the Prairie Oil & Gas Co. of four tracts in the Fairfax district south of the Burbank Field for which competing companies made the Prairie pay $570,000. The northeast quarter of Section 2-25-6 cost the Prairie $115,000; the northwest quarter of Section 22-25-6, $180,000 and the southwest quarter of Section 22-25-6, $235,000, and the northwest quarter of Section 27-25-6, $40,000. Leases 1 to 2 miles west of Section 22, the four quarter sections in Section 19, went for first bid prices, the Barnsdall Oil Corp. getting the northeast quarter of Section 19-25-6, at $300; Laurel Oil & Gas Co. the northwest quarter for $400; Barnsdall Oil Co. the southeast quarter for $300 and C. B. Peters of Tulsa the southwest quarter for $400. Wildcat acreage east of the Burbank Field brought varying prices. A. G. Oliphant of Tulsa got the northwest quarter of Section 29-26-7 for $12,000, while C. B. Peters paid $7,500 for the northeast quarter of Section 30-26-7, and the Phillips Petroleum Co. $4,200 for the southeast of Section 30.

All the tracts put up for sale in Township 28-5, north of the Burbank Field and Township 28-6, northeast of the Burbank Field were passed. They were met by nothing but yawns.

Burbank leases brought good prices. The northeast quarter of Section 28-26-6 was knocked down to The Texas Company at its bid of $243,000; northwest of Section 28 to the Skelly Oil Co. at $415,000; northeast of Section 29-26-6 to Phillips Petroleum Co. at $50,000; northeast of Section 7-27-6 to Gypsy Oil Co., $42,000; northwest of Section 7-27-6, Phillips Petroleum Co., $455,000. The Phillips Petroleum Co. paid $178,000 for the southeast quarter of Section 1-27-5, while the diagonal offset lease, the northwest quarter of Section 1, went to Dick Millard for a paltry $600. No seemed to want it but Mr. Millard.

Among the most interested spect at the sale were a party of easter nancial writers and Wall Street bro who were the guests of the Skelly Co. on a visit to the southwestern fields and Skelly refining properties.

The whole sale brought the O Indians $2,117,300 of which $10 was for east side properties and $2 500 for west side leases, mostly in bank and Fairfax districts.

Two hundred and twenty leases put up for auction and of these 127 not receive a single bid. The wh acreage on the west side did not good to the oil men. Sixty-seven o 96 leases on the west side were passe by the bidders.

OSAGE LEASES SOLD AT AUCTION, SEPTEMBER 30, 1926

East Side

Tract No.	Description	Acreage	Price	Buyer—
1	SE 18-20-12	160	$ 300	Devonian Oil Co.
2	SE 28-22-12	160	300	A. G. Oliphant.
3	SW 28-22-12	160	300	A. G. Oliphant.
7	NW 31-25-12	160	300	Oswego Petroleum Co.
8	SE 12-20-11	160	300	Sand Springs Home.
9	SW 12-20-11	160	300	Sand Springs Home.
10	NW 13-20-11	160	300	Sand Springs Home.
11	NW 27-20-11	160	300	Sand Springs Home.
12	SW 28-20-11	160	300	Sand Springs Home.
15	NE 23-21-11	160	300	Devonian Oil Co.
16	NW 23-21-11	160	300	Devonian Oil Co.
17	SE 17-22-11	160	300	James B. Bragassa and others.
26	SW 26-27-11	160	300	J. A. Sivalls.
31	SW 13-20-10	160	2,200	Sand Springs Home.
32	SE 14-20-10	160	2,300	Sand Springs Home.
33	SW 14-20-10	160	1,100	Sand Springs Home.
34	NW 23-20-10	160	5,900	Clement Oil & Gas Co.
35	SW 23-20-10	160	4,500	Sand Springs Home.
36	NE 26-20-10	160	5,500	Clement Oil & Gas Co.
37	NW 26-20-10	160	5,100	Sand Springs Home.
38	NE 32-20-10	160	1,500	Mid-Co Oil Corp. and others.
39	NW 33-20-10	160	1,900	Mid-Co Oil Corp. and others.
40	NE 12-21-10	160	300	Devonian Oil Co.
41	SE 12-21-10	160	300	Devonian Oil Co.
42	SE 27-21-10	160	300	Devonian Oil Co.
43	NE 33-21-10	160	800	J. B. Bragassa.
46	NW 7-22-10	160	500	Sterling Oil & Gas Co.
47	NE 7-23-10	160	300	Sheeders Oil & Gas Co.
48	SE 7-23-10	160	300	Sheeders Oil & Gas Co.
50	SW 13-23-10	160	800	American Oil Development Co.
61	NE 16-21- 9	160	3,500	Ohio-Osage Oil Co.
62	SE 28-21- 9	160	300	Devonian Oil Co.
65	NE 12-22- 9	160	300	Sterling Oil & Gas Co.
66	NW 23-22- 9	160	600	Ray Branstetter.
69	NW 34-23- 9	160	300	Carl T. Mathews.
71	SW 17-25- 9	160	1,200	American Oil Developing Co.
72	NE 19-25- 9	160	700	American Oil Developing Co.
73	NW 20-25- 9	160	300	J. B. Bragassa and others.
74	SE 27-25- 9	160	2,600	Marland Oil Co.
75	SE 30-25- 9	160	300	McCune and Wade.
76	NW 33-25- 9	160	1,000	Link Oil Co.
77	NE 34-25- 9	160	3,900	Marland Oil Co.
78	NE 7-27- 9	160	300	Charles B. Peters.
79	NW 8-27- 9	160	300	Charles B. Peters.
80	SW 8-27- 9	160	300	Charles B. Peters.
85	NW 35-27- 9	160	300	J. B. Bragassa and others.
87	NE 21-28- 9	160	300	A. M. Landon.
92	SE 14-21- 8	160	600	D. B. Mason.
93	SW 14-21- 8	160	600	D. B. Mason.
94	NE 15-21- 8	160	300	D. B. Mason.
97	NW 11-24- 8	160	300	J. B. Bragassa and others.
98	NW 13-24- 8	160	20,500	The Texas Company.
99	NE 18-24- 8	160	10,500	Producers & Refiners Corp.
100	NW 18-24- 8	160	9,000	Wrightsman Petroleum Corp.
101	SW 20-24- 8	160	700	A. G. Oliphant.
106	NW 26-25- 8	160	300	The Texas Company.
107	NE 27-25- 8	160	2,600	The Texas Company.
112	SE 15-26- 8	160	300	Carl F. Mathews.
114	SE 25-26- 8	160	300	The Texas Company.
117	NW 36-26- 8	160	500	The Texas Company.
126	NE 30-28- 8	160	300	J. J. Fitzstephens.
	Total east side		$ 100,800	

West Side

133	NE 22-25- 7	160	$ 1,600	George Parker.
134	NW 22-25- 7	160	700	Cortez Oil Co.
135	SE 22-25- 7	160	1,600	George Parker.
136	SW 22-25- 7	160	600	Duffield and Howard.
145	NW 29-26- 7	160	12,000	A. G. Oliphant.
146	NW 30-26- 7	160	7,500	C. B. Peters and others.
147	SE 30-26- 7	160	4,200	Phillips Petroleum Co.
149	SW 22-27- 7	160	300	Smith, Leahy Clewin & Freas.
154	NE 22-28- 7	160	300	C. H. Codding.
155	NW 22-28- 7	160	400	Producers & Refiners Corp.
156	NE 13-23- 6	160	300	Prairie Oil & Gas Co.
157	NW 13-23- 6	160	500	Prairie Oil & Gas Co.
158	SE 13-23- 6	160	300	Western American Oil Corp.
159	SW 13-23- 6	160	300	Producers & Refiners Corp.
164	NE 4-24- 6	160	9,500	Marland Oil Co.
165	NW 4-24- 6	160	8,700	Sinclair Oil & Gas Co.
168	NE 19-25- 6	160	300	Barnsdall Oil Corp.
169	NW 19-25- 6	160	400	Laurel Oil & Gas Co.
170	SE 19-25- 6	160	300	Barnsdall Oil Corp.
171	SW 19-25- 6	160	400	C. B. Peters and others.
172	NE 21-25- 6	160	115,000	Prairie Oil & Gas Co.
173	NW 22-25- 6	160	180,000	Prairie Oil & Gas Co.
174	SW 22-25- 6	160	235,000	Prairie Oil & Gas Co.
175	NW 27-25- 6	160	40,000	Prairie Oil & Gas Co.
176	NW 20-26- 6	160	1,000	George Labadie.
177	SW 20-26- 6	160	3,000	Phillips Petroleum Co.
178	SW 22-26- 6	160	8,100	The Texas Company.
179	NE 28-26- 6	160	243,000	The Texas Company.
180	NW 28-26- 6	160	415,000	Skelly Oil Co.
181	NE 29-26- 6	160	50,000	Phillips Petroleum Co.
182	NE 7-27- 6	160	42,000	Gypsy Oil Co.
183	NW 7-27- 6	160	455,000	Phillips Petroleum Co.
185	SE 13-27- 6	160	300	Mid-Co Oil Corp.
194	NW 1-27- 5	160	600	Dick Millard.
195	SE 1-27- 5	160	178,000	Phillips Petroleum Co.
216	NE 26-26- 4	160	300	Cortez Oil Co.
	Total west side		$2,016,500	
	Grand total		2,117,300	

Mid-Continent O. & G. Assn. Will Meet With Petroleum Enginee

The Mid-Continent Oil & Gas Asso tion and the Petroleum Division of American Institute of Mining and Me lurgical Engineers have joined forces holding their annual convention this y The joint meeting will be held in Tu on Monday and Tuesday, October 11 12, the program concluding with a lu quet in the Crystal ballroom of the Mi Hotel at 6:30 Tuesday evening, Octo 12. On the 13th and 14th, the engine will make a tour of the producing fi adjacent to Tulsa.

An elaborate program of papers discussions has been arranged for Monday and Tuesday sessions, which be in charge of the engineers.

At 2:30 Tuesday afternoon, the 12 the regular annual business meeting the Mid-Continent Oil & Gas Associati will be held at Association headquarte No. 505 Cosden Building. At this me ing, the new executive committee w be chosen for the association.

Then, on Tuesday evening at 6:30, t regular annual banquet of the Mid-Co tinent Oil & Gas Association will be h in the Crystal ballroom of the Mi Hotel. The banquet will be attended b members of the association and by t engineers and their guests.

The morning and afternoon sessions each day will be held in the assembl room of the Municipal Building, corn of Fourth and Cincinnati.

The Mid-Continent Oil & Gas Associ tion is one of the strongest oil produce organizations in the country, and has large membership in the Southwest, co ering the States of Kansas, Oklahom Texas, Louisiana and Arkansas. Th Petroleum Division of the Institute Mining Engineers is a growing organiz tion, and the two associations have pool their efforts on this occasion in a co operative program to advance and stim ulate interest in improved methods drilling for, producing and conserving

The banquet on Tuesday evening, O tober 12, will, however, forsake th scientific discussions, the program bei of a different nature. Glenn Griswo editor of the Chicago Journal of Com merce, will make the principal speech the banquet. Judge Amos L. Beaty The Texas Company, and Judson C. Wel iver, public relations director of th American Petroleum Institute, have be invited to appear upon this program, an there may be another number added.

BRANCH IN EL PASO

The Chicago Pneumatic Tool Co. an nounces the establishment September 1 of sales and service branch at El Pas Tex. (Mills Building), in order to be ter serve its rapidly increasing clientel in southwest Texas, New Mexico, easter Arizona and northern Mexico. E. Coughlin will be in charge of the El Pa branch.

GULF PORT SHIPMENTS GAIN 1,935,779 BBLS. IN AUGUST

By P. I. McGreal

HOUSTON, Tex., Oct. 2.—Shipments of refinery products and crude during the month of August from the Gulf ports total 16,285,714 bbls., made up of 9,990,119 bbls. or refinery products and 6,835,595 bbls. of crude. Compared with the July shipments, this is an increase of 1,152,044 bbls. in refined and of 783,735 bbls. crude, or a gross increase of 1,935,779 bbls.

Consignments from the Beaumont-Port Arthur district total 6,929,119 bbls. of the total. The Baton Rouge and New Orleans ports sent out 3,702,210 bbls., the balance originating in the Texas City-Houston ship channel district.

Standard Oil affiliated companies lead the list of shippers in tankers. The Humble Oil & Refining Co. loaded out gross tonnage of 3,635,778 bbls., and the Magnolia Petroleum Co. at Beaumont, 1,754,979 bbls. The Atlantic Refining Co. handled 111,485 bbls. of refined and 779,478 bbls. of crude.

Consignments of refinery products to foreign ports total 2,369,661 bbls., being an increase of 586,311 bbls. over July. No crude was sent abroad during August. The Standard Oil Co. of Louisiana leads in export shipments with a total of 1,034,607 bbls. and the Humble Oil & Refining Co. loaded 860,403 bbls. for shipment abroad.

FROM PORT ARTHUR
By The Texas Company
Refined

Coastwise	1,593,651
Export	244,497
Total	1,837,548
Crude	
Coastwise	64,704

FROM PORT ARTHUR
By Gulf Refining Co.
Refined

Coastwise	2,054,209
Export	97,128
Total	2,151,337
Crude	
Coastwise	155,216

FROM BEAUMONT
*By Magnolia Petroleum Co.
Refined

Coastwise	1,171,812
Crude	
Coastwise	583,167

*Company makes no distinction between coastwise and export shipments.

FROM ATRECO
By Atlantic Oil Producing Co.
Refined

Coastwise	111,485
Crude	
Coastwise	543,217

FROM BEAUMONT
By Atlantic Oil Producing Co.
Crude

Coastwise	186,308

FROM SMITH'S BLUFF
By Atlantic Oil Producing Co.
Crude

Coastwise	49,953

FROM NECHES TERMINAL
By Humble Oil & Refining Co.
Crude

Coastwise	74,372

FROM TEXAS CITY
By Humble Oil & Refining Co.
Crude

Coastwise	614,018

FROM TEXAS CITY
By Swiftsure Petroleum Co.
Crude

Coastwise	362,214

FROM TEXAS CITY
By Marland Oil Co.
Crude

Coastwise	763,572

FROM BAYTOWN
By Humble Oil & Refining Co.
Refined

Coastwise	1,247,766
Export	860,403
Total	2,108,169
Crude	
Coastwise	1,022,113

FROM HOUSTON
By Galena Signal Oil of Texas
Refined

Coastwise	131,000
Export	60,000
Total	191,000

FROM HOUSTON
By Sinclair Refining Co.
Refined

Coastwise	327,934
Export	6,594
Total	334,528
Crude	
Coastwise	426,557

FROM HOUSTON
By Crown Central Petroleum Corp.
Crude

Coastwise	*362,214

*277,168 bbls. account Phillips Petroleum Co.
85,046 bbls. account Plains Pipe Line Co.

FROM HOUSTON
By Deepwater Oil Refineries
Refined

Coastwise	10,000

FROM BATON ROUGE
By Standard Oil of Louisiana
Refined

Coastwise	973,201
Export	1,034,607
Total	2,007,808
Crude	
Coastwise	1,627,970

FROM NEW ORLEANS STORAGE
By Standard Oil of Louisiana
Refined

Export	66,432

GAS FOR STEPHENS, ARKANSAS

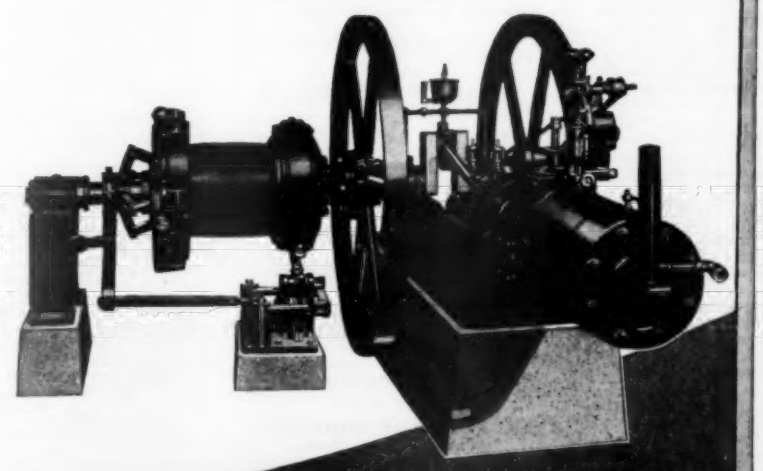
Completions of a series of gas wells just east of Stephens, Ark., townsite within the yast year or so led to the Louisiana Oil Refining Corp. developing a market for the product in Stephens, according to reports to the El Dorado News, which states the company has had representatives in Stephens soliciting signatures to contracts for gas service and that as soon as a sufficient number are secured construction of a line sufficient to serve the community will be begun with completion scheduled for about the first of the year. Confirmation of the report has not been obtained. Only two gas wells have been completed in Stephens during the past year, having a total open flow capacity of 16,000,000 feet per day.

SUMMARY

Water Shipments for August, 1926, Refined and Crude

Company and Port—	Refined	Crude	Total
The Texas Company, Port Arthur	1,837,548	64,704	1,902,252
Gulf Refining Co., Port Arthur	2,151,337	155,216	2,306,553
Magnolia Petroleum Co., Beaumont	1,171,812	583,167	1,754,979
Atlantic Oil Producing Co., Atreco	111,485	543,217	654,702
Atlantic Oil Producing Co., Beaumont	.....	186,308	186,308
Atlantic Oil Producing Co., Smith's Bluff	.....	49,953	49,953
Humble Oil & Refining Co., Neches Terminal	.....	74,372	74,372
Humble Oil & Refining Co., Texas City	.....	614,018	614,018
Swiftsure Petroleum Co., Texas City	.....	362,214	362,214
Marland Oil Co., Texas City	.....	763,572	763,572
Humble Oil & Refining Co., Baytown	2,108,169	1,022,113	3,130,282
Galena Signal Oil of Texas, Houston	191,000	.....	191,000
Sinclair Refining Co., Houston	334,528	426,557	761,085
Crown Central Petroleum Corp., Houston	.....	362,214	362,214
Deepwater Oil Refineries, Houston	10,000	.....	10,000
Standard Oil of Louisiana, Baton Rouge	2,007,808	1,627,970	3,635,778
Standard Oil of Louisiana, New Orleans	66,432	.....	66,432
Total, August	9,990,119	6,835,595	16,825,714
Total, July	8,838,075	6,051,860	14,889,935
Difference	1,152,044	783,735	1,935,779
Exports			
The Texas Company, Port Arthur	244,497	.....	244,497
Gulf Refining Co., Port Arthur	97,128	.....	97,128
Humble Oil & Refining Co., Baytown	860,403	.....	860,403
Galena Signal Oil of Texas, Houston	60,000	.....	60,000
Sinclair Refining Co., Houston	6,594	.....	6,594
Standard Oil of Louisiana, Baton Rouge	1,034,607	.....	1,034,607
Standard Oil of Louisiana, New Orleans	66,432	.....	66,432
Total September	2,369,661	.....	2,369,661
Total August	1,783,350	.....	1,783,350
Difference	586,311	.....	586,311

PATTIN REVERSE GEAR ENGINES



For drilling, cleaning out and pumping you can't buy a better Two Cycle Gas Engine than the new Pattin Reverse Gear Engine.

Under working conditions these engines are developing from 30 to 60% above their rated horsepower and are proving themselves highly efficient and economical in every way.

Fitted with the latest fly ball governors and our built in By-Pass Valve that eliminates all extra by-pass valves and piping. All shaft bearings have chain and ring oilers; reverse gears are made of steel; helical gears are bronze bushed—and run in oil.

Let us send you complete information. Bulletin 30 gives all the facts.

PATTIN BROTHERS COMPANY
Marietta, Ohio

35 CENTS a line first insertion; 25c a line each additional insertion. Cash in advance.

CLASSIFIED WANTS

CREATE AND BUILD BUSINESS

MAIL your advertisement now. It will be published next week. Cash with order.

LEASES—PRODUCTION

FOR LEASE for oil development only, 315 acres upland farm, near Erie, Neosho County, Kansas; natural gas wells on place once. For lease on favorable terms. Inquire of R. N. Cornwall, Box 235 Spencer, Iowa.

I CONTROL over million acres; leases, royalties, drilling blocks and producing properties, southwest Texas, Mexico, including 86,000 acres solid block Mexico; 10 cents acre, 10-year paidup lease. Local agents wanted, liberal commissions. Write me. A. C. Dauchy, Bedell Bldg., San Antonio, Tex.

SHALLOW PRODUCTION
Near San Antonio, details to bonafide purchasers only. George E. Ginter, Calcasieu Bldg., San Antonio, Tex.

BIG WELL southwest corner Jones County, Texas. Nolan and Fisher Counties getting the play. Leases and royalties at attractive prices. Robert Berney, Sweetwater, Texas.

FOR LEASE—45,000 acres in central New Mexico, for 50 cents per acre, 25 cents annual rental. Ten-year lease. Big companies have large holdings that vicinity. Good oil possibilities. D. B. Cole, 421 Amarillo Bldg., Amarillo, Tex.

FOR SALE
900-acre oil and gas lease, Southwest Texas. Price, $450.00. Address
P .O. Box 929, Jacksonville, Fla.

FOR SALE—1,000 or 1,500 acres in fee, near Moss Bluff, Calcasieu Parish, Louisiana, 8 miles north of Lake Charles. Thirty dollars per acre, title perfect. Big boom on in this section Ripe for town lot subdivision or oil exploration. Address Charles Smith, 6419 Vernon Ave., Chicago, Ill.

PRODUCTION WANTED
IN
TEXAS, OKLAHOMA OR KANSAS

We are interested in the purchasing of good, settled production ranging from 50 to 500 bbls. net. Must be good, proven territory ranging from 800 to 2,000 feet in depth and room for more development.
Complete description, price and detailed information must accompany offerings and subject to 30-day investingation. We have the spot cash to deal with.

OHIO MID-CITIES CORPORATION
328 Press Building
Binghamton, New York

SOUTHWEST TEXAS—WINKLER, LOVING, REEVES, WARD, PECOS, CULBERSON COUNTIES
Drilling blocks. Leases. Royalties. Ranches in fee.
H. F. Anthony, Pecos, Texas.

I HAVE LEASES, 160-acre tracts up, in Lipscomb and Hemphill Counties where the big play is now on at $2 to $3 per acre. New leases made direct from owner of land to you. Dr. W. R. German, Canadian, Texas.

FOR LEASE—12,000 acres of land northwest of Keyes, Cimarron County, Oklahoma, on drilling contract or commercial lease, 7 or 10-year lease. This location is attracting a great deal of attention just now. Miss Grace Hackney, 510 N. Broadway, Pittsburg, Kans.

FOR LEASE—8,000 acres by owner, in the famous Owensby Basin in the midst of the State Oil Reservation on the Cimarron River in Cimarron County, Oklahoma, in Townships 5 and 6, Range 7; gas and showing of oil near, and wells to be drilling all around it soon; $5 bonus and $1 rental on commercial lease or $2 bonus on drilling contract 10 months. Seven-year lease; a snap; if interested wire me at once. Dr. O. M. Owensby, Pittsburg, Kans.

10,000 ACRES solid West Grenada, Mississippi, for well. 2 years free; 25-cent rentals 3 years, good geology. L. L. Peeples, Grenada, Miss.

LEASES—PRODUCTION

FOR SALE—Leases and production in Warren, Allen and Barren Counties. Have leases in Barren County joining producing leases and some within half-mile to 1 mile of production. W. P. Harley, Bowling Green, Ky.

FOR SEMINOLE County leases and royalties communicate with Brown Brothers & Co., Seminole, Okla. Box 41.

STRONG gas pressure in well on my 1,000-acre farm. Geologists say oil; will lease good driller. I. E. Beckum, Kilmichael, Miss.

TEN-YEAR oil leases. No rentals. Crockett County, Texas. Send for true map. Paul Konz, Box 291, Fort Worth, Tex.

SOUTHEAST NEW MEXICO
Can furnish practically proven leases in Artesia Field, Eddy County. Also other tracts in Eddy, Chaves and Lea Counties. Particulars on request.
H. T. ORCUTT
1114 Colcord Bldg., Oklahoma City, Okla.

HAVE BUYERS for flush or settled production in Oklahoma and north Texas. Vern R. Hartman, P. O. Box 442, Dallas, Tex.

FOR SALE—Two 40-acre oil leases in Crockett County, Tex Dr. Farmer, 402 Gibbs. Bldg., San Antonio, Tex.

FOR SALE—Choice leases in Panhandle, Texas, oil field, priced to sell. Address Western Finance Co., 7-208½ Taylor St., Amarillo, Tex.

WRITE for my state of Texas oil map free. Oil leases exclusively. Reference, Mercantile Agencies.
C. W. WEBSTER
W. T. Waggoner Bldg.
Fort Worth, Tex.

AMARILLO PANHANDLE OIL FIELD
Underwriter Brainard Ranch oil and gas leases, 25,000 acres in Hutchinson County. Hutchinson County is the major producing area. New 5-year leases from 20 acres to 160 acres. Bought right, can sell at reasonable price per acre. Write for map and prices. I have handled, as underwriter, over 60,000 acres in the field on which over 80 wells are now drilling or producing. Ed R. Mayer, Amarillo Hotel Bldg., P. O. Box 1186, Amarillo, Tex.

HAVE SEVERAL pieces of flush and settled production for sale in Oklahoma and Wichita Falls districts. Prices reasonable and terms can be arranged if necessary. P. O. Box 1144, Dallas, Tex.

ROYALTIES—PRODUCTION

PRODUCING ROYALTIES WANTED
IN
OKLAHOMA OR KANSAS

Settled production preferred. Complete description, price and detailed information must accompany offering.
The purchase or consolidation of other royalty companies would be considered up to $1,000,000. But must stand rigid investigation. We have spot cash to deal with.

OHIO MID-CITIES CORPORATION
328 Press Building
Binghamton, New York.

FOR SALE—One-half royalty of west half of Section 129, Block Z, Hutchinson County, Tex. Address E. E. Jack, Clovis, N. Mex.

WANT TO BUY—Producing royalties. Give description, price, production, depth and age of wells; full details. Address P. O. Box 1359, Tulsa, Okla.

ROYALTIES—PRODUCTION

TEXAS PANHANDLE

Royalties in large or small units to suit any size buyer in fastest growing and most rapid developing oil field in middle west. Write for list of offerings. B. O. Taylor, 306 Blackburn Bldg., Amarillo, Tex.

FEE OWNER wants to sell ¼ interest, or less, in royalty of 1,182 acres in Shackelford County, Texas; ¾-mile of discovery well. Other wells drilling. No dry holes in vicinity. Need cash. J. A. Kendrick, Albany, Tex.

WILL BUY producing royalties direct from owner; send complete information first letter. R. H. Manning, Dan Waggoner Bldg., Fort Worth, Tex.

FOR SALE—EQUIPMENT

FOR SALE — 1,000-h.p. Cooper twin tandem gas engine, front end direct connected to P.R. 2 type Ingersoll Rand compressors. Complete with inter-cooler, after-cooler, exhaust pipe and piping complete. Equipped with 10-ton overhead crane.

Also two 350-h.p. Cooper gas engines with single acting tandem, front end direct connected to Ingersoll-Rand compressors. Complete with inter cooler, after-cooler, exhaust pipe and piping complete. All above can be inspected in operation. Will sell all or part at bargain. Box B-513, The Oil and Gas Journal, Tulsa, Okla.

CASING FOR SALE
12,000 ft. 4½-in. seamless, 16-lb. casing.
10,000 ft. 6⅝-in. 26-lb. casing.
6,000 ft. 8¼ in. 36-lb. casing.
This pipe practically as good as new. Pipe located Three Sands, Okla. 613 Kennedy Bldg., Tulsa, Okla. Phone 2-3052 L. D. 201.

LARGE SPUDDER for sale or trade. Will consider interest proposition, if interested in shallow production. Write W. R. Cox, Moran, Tex.

EMVEE
SIGHT FLOW SEPARATOR

Permits of carrying back pressure on pumping wells, now conceded to be very desirable.

Saves every foot of gas for use on the lease.

Automatically separates oil, gas and water.

Absolutely holds the gravity of the crude.

Reduces amount of B. S. to the minimum.

Eliminates evaporation.

You can see the wells pump.

Positively fool proof.

Sizes 16 bbl., 25, 50, 100 and 130 Bbl.

Send for descriptive matter.

M. & V. TANK COMPANY
Wichita Falls, Texas

ONE No. 23 Star drilling machine, steam traction, complete with tools, $2,000 f.o.b. Los Angeles, Calif. Box B-525, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE—EQUIPMENT

FIVE 12-H.P. Backus horizontal gas engines with friction clutch pulleys; excellent condition, were used to pull fans in schools this city and replaced by motors, $175 each or $750 for the lot. Box B-524, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE—1 Westinghouse 375 KW Turbo Generator unit with surface condenser complete. This unit was installed but never operated and is all in the same condition as when new.
Complete specifications and price quoted on request.

CASPER SUPPLY COMPANY
Casper, Wyo.

FOR SALE

One—Rathbon-Jones Engineering Co. 260 Brake H.P., 3-cylinder, 4-cycle, 260 R.p.m., gas engine directly connected to 160 KW Crocker-Wheeler, 250 Bolt, 260 R.p.m., direct current generator.

One—Westinghouse Machine Co., 120 brake H.P., 3-cylinder, 4-cycle, 260 R.p.m. gas engine directly connected to one Westinghouse Electric Manufacturing Co., 100 KW, 250 volt generator.

One — Westinghouse Electric Machine Co., 40 brake HP, 2-cylinder, 4-cycle, 300 R.p.m., gas engine directly connected to Westinghouse Electric & Manufacturing Co., 25 KW., 250-volt generator.

Parts necessary for changing above to use with natural gas, furnished free.

THE H. C. DARNELL MACHINERY COMPANY
15th & Elmwood Streets,
Kansas City, Mo.
Telephone Clifton 0113

FOR SALE
10,000 each size.
½" Iron Pipe Couplings.
¾" Iron Pipe Couplings.
1" Iron Pipe Couplings.
1¼" Iron Pipe Couplings.
1½" Iron Pipe Couplings.
2" Iron Pipe Couplings.
CAPITOL MFG. & SUPPLY COMPANY
550 Nichols St., Columbus, Ohio.

FOR SALE—First class machine shop, motor driven tools; located in brick building; will lease building. Box B-503, The Oil and Gas Journal, Tulsa, Okla.

USED LINE PIPE FOR SALE
50,000 feet 3-inch
75,000 feet 4-inch
50,000 feet 6-inch
Two miles 60-pound first-quality relaying rails.
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6 lines	2.10	3.60	5.10	6.60
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ADDITIONAL CLASSIFIED WANTS ON PAGE 339

Gradual Easing Reported in Chicago

No Marked Decline in Prices Except in Kerosene, Which Is Materially Lower. Wet Weather Responsible

By J. B. Waldo

CHICAGO, Oct. 2.—The market has shown little change, there has been the same unfavorable weather, the same lack of active demand and the same gradual easing off in the quotations for all major products with the single exception of furnace oils. There has been no marked decline in prices unless it be in kerosene, which is materially lower. The market is waiting for something that will take it out of the doldrums into which it has been pushed by the continued wet weather. The higher temperatures will be felt in the furnace oil business if the warm weather lasts.

The demand for gasoline in the spot market has been confined to scattering cars with an occasional inquiry for a larger quantity over October but most of this larger business had been placed or the inquiry withdrawn. For a number of years there has been an advance in gasoline prices beginning with the middle of October and holding until some time in December and some believe that with seasonable weather in October present refinery prices may be advanced, that the decline in gasoline has been about discounted. Jobbers have stated that they are drawing on stocks as is usual at this season but many plan to hold back orders expecting lower prices and this tendency during many years has been increased by the lack of consumption during the last half of September.

Decline Not Great

In the face of small spot business and reduced takings on contracts, there has been little undue effort made to push business and while the gasoline market is lower there than it was a week ago, the decline is not great, about ¼ cent, and certainly reflects considerable staying power on the part of the refiners. There is little probability that a slash in prices would have materially increased the size of the run. Several refiners have stated they have held firmly to a price of 10½ cents for Motors gasoline and have not made a single sale under that figure during the past week and they say they have sold about as much as those who have lowered their quotations. There has been a very general quoting of 10½ cents for this grade and much of the business booked has been at this figure. Towards the close of the week it was currently reported U. S. Motor gasoline could be bought over October under 10 cents for resale and spot business was done at 10¼ cents with claims made by some jobbers that they had been quoted 10 cents and 10⅛ cents for future deliveries. There has been a good deal of inquiry for rolling cars that could be diverted and this, with the statement of some of the distributors regarding their intention to reduce their stocks during October, indicates that stocks in the country in spite of the reduced consumption, are not large. Stocks at refineries are reported to be light with some of the refiners behind in shipping. The large stocks of gasoline are not in the Mid-Continent Field nor in the central districts, but on the two coasts and as one refiner said, "They are welcome to them, we only hope they will keep them." Some low prices have been quoted in Ohio, said to come from the Atlantic Seaboard, but Ohio has become a sort of dumping ground for refiners east and west and from the Gulf district and the situation there is described as about as bad as they make it.

The demand here has been almost exclusively for the U. S. Motor grade, with some call for the higher gravities but the demand for the latter is not important as to quantity and has not prevented some low prices beink quoted. There have been sales of 60-62 400 grade at 10¾ cents by a local refining organization and the same refiner has sold 64-66 375 at 11¼ cents, but quotations from the field have been about in line with these prices. Some refiners are still holding to 10½ cents for U. S. Motor gasoline but the present average quotation is under this figure. There has been little buying by marketers over October, most preferring to take their chance of the refinery market. Refiners, on the other hand, predict that when the demand does come there will be a firmer market and they claim with crude holding at its present price they will have to get higher prices than the present rates or if crude does decline that the present prices will hold, although even if the stocks are as light as is claimed in the field it will be rather difficult to induce jobbers to act on the belief that the decline in crude has been discounted in the recent declines in refinery prices. There is very little doing in the export market so far as local inquiries are concerned, and exporting organizations state the present outlook is not for any important demand.

Kerosene Weaker

The kerosene market has become weaker during the week and it has been possible to purchase 41-43 kerosene at as low as 7 cents for resale and it is believed at least one large refining organization with local offices might on occasion quote this price direct for a good order. Several sellers are naming 7¼ cents as their price. Late in the week the Standard Oil Co. of Indiana purchased a couple of hundred cars in Kansas for its own stations in that state and nearby. The Texas Company has been a free seller here and generally kerosene has been easy to buy. Other refiners have held for as high as 8 cents and Marland quoted 8½ cents and stated they meant it. The Empire, Shaffer, Cosden, Roxana and others have quoted 8 cents, but the demand is light as a rule and the tendency is not to carry stocks as sellers claim the kerosene demand for tractor use cannot be large this fall unless there is a very quick drying of the fields over a large territory. Most of the concerns named have a place to put a quantity of their output, either at their own stations or on contracts or both.

Marginal Contracts

The matter of making marginal contracts for gasoline, kerosene and other major products is being considered with more favor by refiners this year than it was a year ago. The Roxana Petroleum Corp. has been seeking such contracts, presumably in anticipation of having the output of its new refinery at East Chicago to market as it is stated it will be running crude at that plant by some date in February. Even if there are the usual delays in the actual completion of this plant there will surely be a considerable amount of products available by the early spring in time for the first demand for increased quantities of gasoline so the desire of the Roxana management for an established outlet for at least a part of the product is understandable. But other refinery sales organizations have expressed themselves as more favorable to making marginal contracts. Some have stated that the bulk of their contract customers have played very fair with them this season. Some jobbing concerns have such a reputation for laying down on their refinery when the contracts were not wholly favorable to them owing to the turn of the spot market that good refiners do not want contracts with them and the time will come when the opportunities for such concerns to make marginal contracts will be limited to less reliable sources of supply than the larger refiners.

First Frost's Effect

The first frost usually brings to the tankwagon distributor of distillates, gas and fuel oils a lot of orders from small plants and the home owners who want their tanks filled. There was quite a bit of frost on Friday a week ago and the usual demand was felt. Local distributors who had stated their business was light or almost at a standstill suddenly were very busy and many sought additional supplies. They wanted cars that could be delivered from the tracks or diverted to them. One large concern which has a large stock of Smackover wanted straw distillate, another that has a good gas oil contract, wanted fuel oil and so on. The impression was that the tankwagon distributors have not complete supplies and this strengthened the local market especially for distillates. A good 38-40 straw distillate is firm at 6 cents with very little offered and a dark distillate with the requisite flash and cold test at 5⅞ cents. The present active demand is not expected to last as most of those who have had their tanks filled will use little oil as long as the warm weather continues. Last year there was a hard freeze in this State about October 10, and no warm weather after that date, but this is unusual.

There has been a lot of business caused by the cold snap and distributors are adding to their stocks and reluctantly paying the price, which is only higher on the distillates, as gas oil is no higher and fuel oil lower. There has been considerable inquiry for grades of oil from 26-28 up with a zero low cold test for heating purposes.

Gas Oil

Gas oil is selling just about where it was a week ago with a fair demand chiefly from distributors to small industries and the homes. The gas companies are not heavy buyers now as many have made contracts for supplies for at least a part of their needs and only an occasional order is entered in the spot market. The industrial demand is unchanged with no large business reported, just the small orders that have ruled this season so far from most buyers. For the cracked, dark gas oil 4⅛ to 4¼ cents is the market and for the uncracked gas oil 4¼ to 4½ cents, the latter price and even higher prices being paid for light oil. There is an idea among many in the trade that there are large stocks in the field which will come on the market shortly. Refiners scout this idea here, but in some cases refiners that had no gas oil to sell a short time ago are now looking for buyers.

Fuel Oil Softer

The fuel oil market has softened considerably. The more free offerings recently noted have increased and prices were quoted by a number of refiners for delivery over October that averaged just about the low of the spot market. Several quotations were at hand of $1.40 for 24-26 over October and other grades in line. Since the first of the month one large organization that has held its prices rather more firmly and has lost considerable trade by its attitude towards buyers, has reduced its price to $1.27½ for an 18-20 fuel oil. Regarding these heavier grades there is considerable complaint by consumers and the prediction is made that if the refiners continue to ship oil of the same kind it will be the quality of the oil as well as the price that will force some users to resort to other fuels. One consumer said the oil he had been getting was thick, gummy, full of dirt, that no amount of preheating would make it flow freely and evenly and that it took twice as much time and work to keep the burners in shape. Some have openly expressed their opinion that a good treated Smackover fuel oil was really better than the same gravity of refinery fuel oil as at present prepared for market. This critic said the cracking process seemed to take all that was good and desirable out of the fuel oil and to leave nothing but the bad behind. It is not believed this applies to all refiners but to some. The Smackover fuel oil has held its price with much firmness. This is due to the decreased output of which a substantial portion is pipelined to southern refineries and other quantities to southern consumers so that the quantity available for the northern market is not in excess of the demand. The market continues to hold at $1.30 with some asking $1.32½ and little, if any, good oil available at anything less than the first named price. Treated Smackover fuel oil is favored by the tank truck distributors on account of its low cold test, for one thing. It blends well, for another. One local distributor is receiving a car a day on a contract of 600 cars, and all of them are using some of the oil.

Lubricating Oils

There seems to be nothing new in lubricating oils. Some refiners have bright stocks to sell and others are still ordered ahead or just caught up. The consumption of motor oils has suffered along with gasoline, but there have been no price changes announced. The industrial demand is fair and the export inquiries small.

Tankwagon Situation

There has been no general tankwagon change announced over the Standard Oil Co. of Indiana territory. If the refinery market continues to sag it simply makes the maintenance of prices a more difficult matter. The spread between the refinery market and the average tankwagon price is growing so that it promises to be unmanageable especially when the local jobbers are not getting the business they think they should have. There is about the same amount of price cutting at various points over the territory due to local competition resulting in price wars between the independent distributors. The gallonage for September is expected to show a gain over last year but not what it would have been had the weather been normal. The last two weeks of the month reduced the gain recorded for the first half.

GASOLINE IS SOFTER IN PENNSYLVANIA MARKETS

OIL CITY, Pa., Oct. 4.—The situation during the past week in the Pennsylvania refined markets was none too bright.

Gasoline is a little softer due largely to the offering of cheaper gasoline by some of the larger refiners in the East.

Kerosene has been slipping some in both demand and price. The immediate future of this product depends a great deal on the weather. If there should be good weather for a time there would be a tremendous amount of all plowing and sowing done and this would mean a greatly increased kerosene demand.

Fuel oil has been holding up good during the week. Wax is a trifle softer in both demand and price. Neutrals continue to hold up. The demand has eased off a little, but it is still excellent. Cylinder stocks continue to be the really bad feature of the market and there was no improvement for them during the week. Bright and filtered stocks continue good.

LARGE CONSUMPTION IN THE EAST DESPITE UNFAVORABLE WEATHER

By N. O. Fanning

New York Bureau, The Oil and Gas Journal, Room 543, 30 Church St., New York City

NEW YORK, Oct. 2.—Whatever else may be said about the refined oil situation on the Atlantic Coast, the chief feature is the large consumption of gasoline and lubricating oils, despite unfavorable weather, and notwithstanding what may be the situation in other sections of the country.

So far marketers have had little difficulty in maintaining prices at current levels, with the exception of a few local points. One of these is Boston, where Atlantic Refining and some independent service station dealers are selling 2 to 3 cents a gallon under the quotations of the Standard Oil Co. of New York. In New York City and vicinity, in Baltimore and Philadelphia, to the best of knowledge, the tankwagon price of 21 cents, and retail price of 24 cents, is the rule.

In northern New York, prices are on the whole lower than in and around the coastal points. This is usually the case at this time of year, when interior gasoline seems always to find its way into the section between Buffalo and Albany, and at a discount. Consumption there is smaller, however, than on the Atlantic Seaboard proper.

A study of the tankwagon situation seems to indicate the main fear of a general change in prices throughout the Atlantic Coast rests on a possible continuation of bad weather throughout October, on the one hand, and a spread of the gasoline price war on the Pacific Coast throughout that territory. The latter eventuality would, in the opinion of marketers here, be felt on the Atlantic, because so long as California gasoline is marketed on the Atlantic on a large scale, they believe the tankwagon price here cannot be maintained at 3 or 4 cents a gallon above Pacific prices. A local gasoline price war on the Pacific, however, should not be reflected in the eastern market. Statements have been made quite generally that as contracts with eastern refiners were made on the basis of eastern prices, the latter market would not reflect any change in California quotations. Careful students maintain, however, that so long as contracts exist, the general level of prices must be the same, allowing, however, for freight from California to the Atlantic, which is, roughly, 2 cents a gallon. The reason for this is obvious. Eastern refiners cannot afford to pay 3 cents a gallon more for California gasoline than their competitors would have to pay, as the rule has been competitors are quick to take advantage of any spread in prices.

August returns showed a substantial decline in stocks of gasoline on the Atlantic Coast. September was, on the whole, a good month, despite unfavorable weather the last week. There is not, therefore, much fear of a decline in prices unless due to outside influences.

Kerosene

The kerosene market has held fairly well, although recently tank car material has been shaded somewhat. Water white in tank cars is quoted around 10¾ cents, against a high of 11 cents about a month ago. Demand is improving, but there seems to be more on the market at present. Prime white is 10½ cents in tank cars.

Fuel Oil Lower

The Standard Oil Co. of New Jersey reduced bunker fuel oil 10 cents a barrel on the Atlantic Coast, effective October 1. The current market is $1.65 at New York, Baltimore and Norfolk, and $1.60 at Charleston (lighterage 5½ cents a barrel extra.)

Diesel oil remains firm at $2.50 and gas oil is holding at 6¾ cents a gallon.

The reduction in bunker fuel oil is expected to have a stimulating effect on consumption, especially since propaganda has been freely spread that an advance in prices was in store which would make bunker oil more expensive than coal. As the coal market has quieted down, with outlook for comparatively low prices in the absence of strikes or other influences, oil marketers must look to their laurels to maintain a market in the face of coal consumption this winter.

Lubricants Quiet

Lubricating oils are steady, with improved demand for red and pale oils. Prices, however, are unchanged.

Paraffin wax is also firm. Petrolatums are moving more freely, but quotations exhibit no hardening tendency yet.

Far East Exports Heavy

Large shipments of oil products to the Far East featured the export market here during the past week. The kerosene movement was especially heavy, and included a bulk shipment to India of 3,771,929 gallons. In addition, there was one kerosene shipment of 159,820 cases to China.

Bulk shipments of gasoline to all countries for the week amounted to 6,200,108 gallons, while bulk exports of kerosene totaled 6,297,539 gallons. Aside from the shipment to India mentioned, all bulk products went to Europe.

Other large shipments included one of 101,000 cases of kerosene to Argentina, and a shipment comprising 500 tons of petroleum coke to Norway, this following on one of similar size a few weeks ago.

Gasoline Prices Reduced

The Standard Oil Co. of New Jersey reduced export gasoline in cases one-half cent to 28.40 during the week. This was in sympathy with weakness in the Gulf Coast market.

Kerosene for export continues firm, and with continued heavy orders from all foreign divisions it is difficult to find a reason for any weakness in prices.

The export demand for lubricating oils is holding up very well, and a seasonal increase in shipments is expected up to the end of the year. The same can be said of paraffin wax. Crude wax has been in especially good demand in recent weeks.

The following table shows principal exports of petroleum and petroleum products from New York reported during the last three weeks (figures in gallons unless otherwise noted):

	Week Ended—		
	Sept. 29	Sept. 22	Sept. 15
Gasoline:			
Bulk	6,200,108	837,662	
Barrels	85,300	118,950	201,700
Cases	1,862,150	1,676,560	1,503,090
Kerosene:			
Bulk	6,297,539	1,073,393	234,809
Cases	3,849,230	3,222,050	1,747,240
Gas Oil:			
Bulk	452,025		
Lubricating Oil:			
Bulk		896,495	1,456,582
Barrels	684,300	1,770,600	730,250
Cases	256,830	232,640	116,280
Lubricating Grease:			
Barrels (lbs.)	589,050	1,229,400	444,125
Paraffin Wax:			
Bags (lbs.)	848,100	2,570,260	496,100
Barrels (lbs.)	669,750	2,099,025	311,600
Petroleum Asphalt:			
Barrels (lbs.)	237,500		
Petroleum Coke:			
Bags (lbs.)	1,232,000		

The foregoing figures include shipments of 500 bbls., 1,000 cases, or more.

Tanker Charter Market

The demand for tankers during the past week converged largely on vessels of foreign registry, with rates unchanged. New fixtures included the following:

Tanker Java (Nor.), 12,600 tons, Abadan to United Kingdom, 34s. 3d., October loading.

Tanker Weehauken (Br.), 3,700 tons, Batoum or Novorossisk to Continent, 25s. 6d., November-December loading.

Tanker Neptune (Ger.), 8,000 tons, gas oil, Gulf to United Kingdom-Continent, 26s. 3d., option Denmark, November loading.

Tanker Sommerstad (Nor.), 7,600 tons, clean oil, north Atlantic or Gulf to Durban, 46s. and 47s., October-November loading.

Oil Receipts Higher

During the past week an increase in imports of oil from Mexico was a feature, these amounting to 108,000 bbls. daily, against 48,000 bbls. daily the week before. Total receipts from all sources amounted to 3,665,000 bbls., a daily average of 524,000 bbls.

Receipts from the Gulf Coast for the week (ended September 29) amounted to 2,155,000 bbls., or 308,000 bbls. a day. The Pacific Coast contributed a total of 489,000 bbls., or 70,000 a day. Imports from South America (and Trinidad) aggregated 363,00 bbls., or 52,000 bbls. daily.

The following table shows estimated daily average receipts of crude and refined oil by water at Atlantic Coast ports for the last three weeks; also monthly record for the last 12 months (figures in bbls.):

Source—	Week Ended— Sept. 29	Sept. 22	Sept. 15
Gulf Coast	308,000	231,000	319,000
Pacific Coast	70,000	114,000	96,000
Mexico	108,000	48,000	41,000
*South America	52,000	76,000	10,000
Total	538,000	469,000	466,000

Daily Averages by Months					
1926	Gulf	Pacific	Mexico	So. A.	Total
Aug.	320,00	61,000	71,000	46,000	498,000
July	360,00	66,000	115,000	36,000	577,000
June	396,000	104,000	117,000	18,000	635,000
May	318,000	66,000	114,000	25,000	523,000
April	326,000	92,000	126,000	20,000	564,000
March	317,000	97,000	152,000	26,000	592,000
Feb.	332,000	73,000	104,000	18,000	527,000
Jan.	279,000	59,000	65,000	31,000	434,000
1925:					
Dec.	298,000	56,000	90,000	13,000	457,000
Nov.	259,000	36,000	80,000	12,000	387,000
Oct.	249,000	36,000	80,000	22,000	387,000
Sept.	306,000	66,000	66,000	10,000	448,000

*Including Trinidad.

The foregoing estimates are based on the carrying capacity of incoming oil-laden tankers.

REFINED PRODUCTS WERE SOFTER IN SHREVEPORT

SHREVEPORT, La., Oct. 2. — All products in the Shreveport refined market were softer during the past week and stock movements were slower than during the preceding week. However, few Shreveport refiners reduced their runs on the first of the month and one refiner's runs were increased. The spot gasoline market was the most active product of those made although its activity was not impressive. Refiners were meeting with fair success in holding prices firm.

Natural gasolines took their first decided slump in the territory in several weeks. Last week the product trailed in the wake of other weakened markets. Kerosene was weaker and having little demand.

Gas oils also were weak and refiners were having difficulty in disposing of them. Distillate also was less in demand. Fuel oil remained unchanged in price, but inactive.

ETHYL GASOLINE WELL RECEIVED IN MOUNTAINS

DENVER, Colo., Oct. 4.—The Continental Oil Co. soon will be distributing ethyl gasoline throughout its entire territory, except in states where the distribution is by other companies, according to information from the general offices of the company. The company started the distribution of the gasoline in the Rocky Mountain states the latter part of August under the name of Conoco ethyl gasoline, Conoco being the company trade name used with other grades of gasoline.

It is known that the product has been well received by the motorists of the mountain areas. Ethyl gasoline is said to give excellent results in the hill and mountain climbing, which are part of motoring in this section of the country.

The company is blending the gasoline at its Florence, Colo., Farmington, N. Mex., and Sapulpa, Okla., refineries. The company will be unable to distribute the sale of ethyl has just started in Oklahoma. The company will be unable to distribute the gasoline at its stations in several states of the Middle West, as distribution rights are held by the Standard Oil Co. of Indiana. The ethyl gasoline, as in other states, is sold at a 3-cent premium.

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CLASSIFIED WANTS
(Continued from Page 337)

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Many Changes in Gasoline of Future

Certain Specifications Now Considered Important Will Be Dropped With Value Determined by Engine Performance. Supply Adequate

By Dr. Gustav Egloff*

EGLOFF SUMMARIZES FUTURE MOTOR FUEL

1. It will be a blend of straightrun gasoline and cracked, derived from petroleum, coal tar, wood tar or shale oil.
2. It will yield double the mileage per gallon.
3. Its specifications will be antiknock and ease of starting the engine.
4. It will not have a color, odor, doctor or sulphur specification as to its suitability.
5. Our potential future gasoline supplies will last for hundreds of years, and, will be derived from the cracking of petroleum, coal tars, wood tars and shale oil.

The urge of the day is to produce high antiknock gasoline in quantities sufficient to operate all motor cars under high compression for it is certain that the gasoline of the future will operate automotive engines yielding double the mileage per gallon over that now being obtained. The future gasoline will bring about an economic saving of hundreds of millions of dollars and millions of barrels of crude oil per year. The future gasoline will come predominantly from the cracking of petroleum oil with secondary quantities from the cracking of coal tar, wood tar, and shale oil.

The future gasoline will contain hydrocarbons produced by cracking having antiknock characteristics which will operate the highest useful compression pressure motor practical to build. At the present time approximately one-third of the gasoline being produced is derived from cracking heavy oils. The future gasoline must be produced in quantities so that approximately 75 per cent of the total gasoline is derived from cracking, blending with straightrun gasoline, so as to produce an antiknock motor fuel which will operate the highest useful compression motors, hence doubling the mileage over present day motors.

The future gasoline will be a blend of hydrocarbons derived from crude oil, coal tar, wood tar, or shale oil.

The antiknock properties of gasoline are inherent in the type of hydrocarbons present and their amount percentagely. In gasoline there are four groups of hydrocarbons whose speed of reaction with air varies quite widely. The groups of hydrocarbons present in gasoline are those of the paraffin series, the unsaturated, naphthene and aromatic. As a function of the amounts of the four groups of hydrocarbons present in a gasoline, it may be entirely nondetonating or detonating to a high degree in a high-compression motor. The cracking reaction may be so controlled that the nondetonating hydrocarbons can be produced in relatively high percentages, and be produced in quantities which will lend themselves particularly to blending with straightrun gasoline so as to improve its burning qualities.

Paraffin Hydrocarbons

The paraffin hydrocarbons are notorious detonators when under combustion conditions in an automotive cylinder. The paraffins have a tendency to explode at a high velocity when under pressure conditions of an automotive cylinder and the exploding effect of high velocity of combustion increases with increase of pressure. Paraffin hydrocarbons are chemically called straight-chain compounds composed of hydrogen and carbon. The per cent of hydrogen in relation to the carbon content of the molecule is at its maximum compared to any other type hydrocarbon. Although paraffin hydrocarbons are notorious detonators, but recently a new paraffin hydrocarbon has been made in the laboratory by Dr. Graham Edgar, called tri-methyl-isobutyl methane, which has antiknock properties equivalent to benzol, whereas the normal octane having the same number of carbon and hydrogen atoms as the synthetic octane **is a violent knock inducer**. A paraffin hydrocarbon gasoline is a poor motor fuel as such and requires the addition of dopes, benzol, or cracked gasoline to make it useful in a high-compression motor.

Unsaturated Hydrocarbons

The unsaturated hydrocarbons are straight-chain compounds similar to the paraffins but strikingly different in reactivity toward chemical reagents, particularly oxygen. The combustion of unsaturated hydrocarbons in an automotive engine under pressure takes place relatively slowly so that there is no tendency toward knocking but relatively quiet burning. The quiet burning of unsaturated hydrocarbons is due to its chemical constitution. There are two less hydrogen atoms in the molecule when compared to a paraffin hydrocarbon having the same number of carbon atoms. The mere difference of two hydrogen atoms in the molecule (comparing the same number of carbon atoms in the unsaturated and the paraffin hydrocarbons) so profoundly modifies the combustion velocity that there is apparently an entirely different effect taking place in an automotive cylinder during combustion of paraffin and unsaturated hydrocarbons.

As far as we know there are practically no unsaturated hydrocarbons present in gasoline derived from the normal distillation of crude oil, however, when petroleum oils are distilled under pressure there is produced a high percentage of unsaturated hydrocarbons in the cracked gasoline. The percentage of unsaturated hydrocarbons present in cracked gasoline is a function of the temperature, pressure time and type cracking stock. The unsaturated hydrocarbons present in cracked gasolines have a utility of major import in the operation of high-compression motors due to their nondetonating tendency under combustion conditions of high pressure.

Naphthene Hydrocarbons

Naphthene hydrocarbons are present in straightrun gasoline particularly those derived from California, Texas and Smackover crude oil fields. The naphthenes have nondetonating properties which increases the utility of the gasoline for automotive use under high compression. The naphthenes burn relatively slowly in an automotive engine under pressure and are somewhat superior to the unsaturated hydrocarbons in this respect. The chemical constitution of the naphthene hydrocarbons is markedly different than either the straight-chain paraffin or unsaturated. The naphthenes are cyclic or ring structured hydrocarbons of a saturated nature having the same percentage of hydrogen of the molecule as the unsaturated (ethylene series) hydrocarbons. The naphthenes have the maximum percentage of hydrogen possible under its ring structure. Although their structure is entirely different to the paraffin hydrocarbons they act chemically somewhat alike under normal conditions, but under the compression pressure of an automotive cylinder the naphthenes burn quietly without violence.

The chemical structure of the naphthene hydrocarbons undergoing combustion at high pressure in a cylinder differentiates it from the paraffin and unsaturated hydrocarbons and gives it superior properties as a gasoline. Under cracking conditions naphthene hydrocarbons are produced in material percentages of utility to the cracked gasoline produced.

Aromatic Hydrocarbons

Another group of cyclic or ring-structured hydrocarbons are those of the aromatic series. The aromatic hydrocarbons have six less hydrogen atoms to the molecule for the same number of carbon atoms present than those of the unsaturated and naphthene groups. The aromatic hydrocarbons are unsaturated cyclic compounds which have remarkable nondetonating properties under the highest practical compression pressure which may be used in an automotive engine. The low boiling point members of the aromatic series are benzol, toluol and xylols which are nondetonating under the highest pressure it would be practical to build an automotive engine for service use. They are so high in nondetonating properties that they may be blended with straightrun gasoline bringing it to a nondetonating value suitable for high-compression motor use.

The aromatic hydrocarbons burn very slowly under pressure conditions prevailing in a high-compression motor. The rate of oxidation or combustion is due to the chemical constitution of the aromatic hydrocarbons and is the reason why they burn so slowly under high pressure conditions comparative to the paraffins, unsaturated and naphthene hydrocarbons, for they all contain the two elements hydrogen and carbon in different chemical combinations and constitution.

Aromatic hydrocarbons are present in straightrun gasoline derived from California, Texas, Smackover, Java, Borneo and other oil fields. The aromatic hydrocarbons are produced in the cracking of petroleum oils in relatively high percentages. The higher the percentage of aromatic hydrocarbons formed the greater the utility as a gasoline in an automotive engine and can be blended with straightrun gasoline to bring up the mixture to a gasoline of service in a high-compression motor.

Cracking Coal Tar

The cracking of hydrocarbon oils is becoming so diversified that it will not alone include conversion of petroleum oils but also coal tar, wood tars and shale oil into gasoline.

The quantity of gasoline derivable from the cracking of the potential coal tar (at present bituminous coal yearly production) would be over 100,000,000 bbls. of motor fuel a year which is approximately 35 per cent of the gasoline now being produced in the United States. The motor fuel from the cracking of low-temperature coal tar is an antiknock gasoline of over 50 per cent benzol equivalent, suitable for blending with petroleum-derived gasoline.

A fruitful source of high antiknock motor fuel is that derivable from the pressure distillation of wood tars. The gasoline produced from the cracking of wood tars has a benzol equivalent of over 75 per cent and is suitable as a blending agent with straightrun gasoline and cracked gasoline derived from petroleum coal tars.

A potential source of gasoline in the United States available is that derivable from the cracking of over 108,000,000,000 potential barrels of shale oil distributed through our shale deposits in the United States which can be cracked into over 50 per cent of antiknock gasoline or over 54,000,000,000 bbls. of gasoline which would operate high-compression motors or could be blended with straightrun gasoline, cracked gasoline derived from petroleum, coal tar or wood tars. It is reasonably certain that the crude oil supplies of the United States will continue for years with a diminishing supply. But one can rest assured in our resources of coal, shale and wood that we can produce with the cracking process the necessary gasoline supplies when desired. The future gasoline will be a blend of straightrun gasoline and cracked products derived either from coal, shale or wood, or a blend of or combination thereof, as the economic situation demands. The blended gasoline will be of a standardized character so that regardless of what part of the country one may be motoring in, a standardized gasoline will be available to operate the high-compression engines which will be in use.

California Possibilities

The commercial cracking of heavy oils is going on in various parts of the United States. One of the most prolific oil sections of the country is that of California where a daily production of 600,000 bbls. of crude oil is taking place which under cracking conditions would produce a high antiknock gasoline having as an average under present cracking conditions a benzol equivalent of approximately 35 per cent. Cracked gasoline yields are being obtained on the basis of fuel oil cracking of 50 per cent and my calculations indicate that if the 600,000 bbls. of daily California oil production were cracked, that California could supply the United States with approximately one-half its current demand for gasoline, having properties suitable to operate high compression motors.

One of the remarkable crude oil fields of the United States is that of Smackover. It is still producing at the rate of 135,000 bbls. per day or at the rate of approximately 50,000,000 bbls. a year. Smackover crude oil lends itself peculiarly to the production of a high antiknock motor fuel under pressure distillation conditions. Smackover crude oil is being converted into over 50 per cent cracked gasoline having a benzol equivalent of 40 per cent or more. Smackover cracked gasoline is suitable for use in a high-compression motor and should the daily production of the Smackover Field be cracked it would approximate 10 per cent of the total gasoline requirement of the United States for the year 1926.

Cracking stocks derived from Mid-Continent crudes under present conditions of cracking yield cracked gasoline ranging in benzol equivalent of from 20 to 30 per cent.

Certain oil fields of Texas relatively small in production under average cracking conditions yielded cracked gasoline relatively high in antiknock properties which show a benzol equivalent of 35 per cent or more.

Economic Waste

The United States has vastly more crude oil than is economically required. It is producing at the rate of 750,000,000 bbls. per year. Approximately 4,000,000,000 gallons of cracked gasoline will be

*Research Laboratories, Universal Oil Products Co. Address at Four State Jobber Convention, Kansas City, Mo., September 28.

produced during the year 1926. This volume of cracked gasoline is equivalent to having discovered oil fields producing 500,000,000 bbls. of crude oil. Stated in another way, each modern cracking unit is equivalent to a 200,000 bbl. oil well containing 50 per cent antiknock gasoline; hence the future may well show that much less crude oil will be demanded than at the present time, due to the full economic use of the crude oil by converting it into more useful products than burning under boilers. Our resources of oil have always been ample for our every need; as a matter of fact, always in real excess, as is shown by the vast amounts in storage. The dismal prophets have had their day almost from the beginning of the industry and still sing a song of shortage. The oil industry has never failed to produce every product called for in ample quantity demanded, and cannot fail in the future with the enormous amount of research going on to increase the economic value of oil products derived from crude oil.

Treating of Gasoline

One of the most difficult problems in the oil industry is the refining of cracked gasoline without loss of valuable antiknock components. The difficulty does not lie in the meeting of market specifications, but the loss of actual gasoline may run as high as 20 per cent due to the amount of acid treatment necessary to meet certain specifications. The usual method of refining cracked gasoline is by treating with the chemical reagents sulphuric acid, caustic soda, sodium plumbite and water. These reagents are added in varying amounts and the order of their addition to the gasoline undergoing treatment also varies.

The amount of sulphuric acid which is used may range from approximately 2 pounds to over 20 pounds to the barrel of oil undergoing treatment.

And what is the function of the chemical treatment of gasoline? It is for the purpose of producing gasoline according to specifications: (1) Water white color; (2) odor removal; (3) negative to the doctor test; and (4) sulphur 0.10—0.15 per cent.

There are still specifications which demand a water white gasoline but as far as the performance of gasoline in an automotive cylinder is concerned color means nothing. However, it means something to the refiner who has to acid treat out certain colored components which are only present in traces, but in taking out the traces there is a material loss not alone in gasoline but also in its properties as an antiknock motor fuel. It is a happy sign when one drives about the country to see in visible bowls not alone yellow gasoline but pink, red, green and blue in addition to water white. The motor is no respecter of color and will operate as well with yellow as with water white, blue, green or red gasoline. It may well develop that special gasolines will be put on the market to match the color of the car or as one refiner in Kentucky who plans a blue gasoline, naming it "Blue Grass Gasoline."

Importance of Odor

Odor is another test that is too rigidly adhered to and really has little place in a specification for gasoline. To bring an average cracked gasoline to so-called good odor is wasteful of chemicals and adds to the loss of actual gasoline.

The doctor test is one to determine the so-called sourness of a gasoline due to the sulphur compounds present. It has been shown that the doctor test does not react with all sulphur compounds present in a gasoline for there may be substantial percentages of sulphur present which is not disclosed at all by this test. On the other hand with no sulphur compounds present in the gasoline the doctor test may show it to be sour. Hence this test has no real importance as disclosing the value of a motor fuel and should be eliminated.

The removal of sulphur from gasoline, particularly those containing percentages as high as one, is an expensive procedure not alone in the cost of chemicals but also in the loss of valuable gasoline. In the refining of a 1 per cent sulphur-content gasoline a loss of 20 per cent of gasoline resulted when meeting a market specification of fifteen-hundredths of 1 per cent.

Less than one-half of this loss would be encountered using approximately one-half the amount of chemicals, if the specifications were three-tenths per cent sulphur or above. It is not clear where motor difficulties ensue as a function of increasing percentages of sulphur in the gasoline. It would appear as if one-tenth of 1 per cent sulphur in a specification is an arbitrary upper limit for eastern gasolines and the whole subject of sulphur toleration in gasoline should be thoroughly studied. Since the advent of the ventilation system in crankcases of motor cars, condensation of moisture therein is prevented, hence no sulphurous or sulphuric acid could form therein. The combustion of sulphur to sulfur dioxide and trioxide gives out energy and functions like any other gas in a motor. Fuel oil of high sulphur content is satisfactorily burned in a Diesel engine, hence the sulphur compounds in gasoline should burn satisfactorily.

ROCKY MOUNTAIN AREA

(Continued from Page 58)

Oil Co.'s test on the Lockhart Canyon Dome is rigging up

New Wyoming Tests

In Wyoming two new tests are drilling in the eastern part of the state. On Hat Creek, Niobrara County, east of the Lance Creek Field, the Pennsylvania Western Petroleum Co. started spudding on a deep well that is to go to the Dakota. This is a wildcat and is too far from Lance Creek to be an extension of that field.

In the Lance Creek Field, the Wyoming Montana Development Co. started a well inside the field limits, about 2 miles west of the Union Oil Co.'s camp, on the Johnson ranch.

Salt Creek Comp'etions

In the Salt Creek Field, the Midwest Refining Co. completed only three new wells the past week. In Section 35-40-79, the Midwest Oil Co. brought in a producer at 1,490 feet and shot into production. This well will make a pumper. In the same section the same company also drilled a deep dry hole to the Sundance sand. This well found both the Lakota and the Sundance sands dry and was abandoned.

The Wyoming Associated Oil Co. found an average producer in Section 23-40 79 at 1,525 feet and this well will make an average producer on the pump.

New Sunburst Producers

The California Co completed two new producers in Sunburst, one in Section 28-35-2 found a production in the Ellis sand at 1,480 feet and will make 50 bbls.; the second well, in Section 26-35 2, found the Ellis sand at 1,497 feet and a small showing; it looks doubtful.

The Ferdig Oil Co. had three dusters drilled into the Ellis sand the past week, and the Andrus Oil Co., in Section 26-35-3, has a producer good for 40 bbls. in the Ellis sand at 1,450 feet. John Andrus, Jr., also found production in the same section at 1,500 feet in the Ellis sand and the well will make 25 bbls.

The Carter Oil Co. found a 40 bbl. well at 1,646 feet in Section 11-35-2 and the Queen City Oil Co. has a well good for 25 bbls. in Section 18 34-1.

Runs From the Fields

Salt Creek	46,480
Teapot	1,070
Big Muddy	3,310
Grass Creek	3,120
Elk Basin	890
Greybull	20
Rock River	2,740
Notches	150
Rex Lake	200
Lance Creek	1,120
LaBarge	220
Poison Spider	630
Osage	340
Hamilton Dome	1,150
Lander	230
Byron	40
Pilot Butte	40
Lost Soldier	5,270
Ferris	80
Simpson Ridge	130
Cat Creek	2,710
Lake Basin	280
Sunburst	20,000
Florence	500
Moffat	3,205
Tow Creek	725
Fort Collins	3,575
Boulder	25
Rangeley	100
Hogback	690
Rattlesnake	1,235
Artesia	3,000
Total	103,355

FOUR STATE JOBBERS TO HOLD ANNUAL SESSIONS

(Continued from Page 32)

discount any prediction relative to a shortage of motor supplies.

Higher Endpoint

One interesting prediction made by Doctor Egloff in answer to an inquiry from the floor was that the tendency in the future would be to raise the endpoint of gasoline. This is contrary to the trend during the past year when practically all refiners have been forced to manufacture better than the 437 endpoint U. S. Motor requirement due to the fact that several major distributors have been offering their customers a 400 endpoint material at the usual price for U. S. Motor.

Doctor Egloff, however, believes that this development is temporary. He said the trend in the design of automotive engines will be to obtain a motor which will secure more miles per gallon of motor fuel and this necessarily means raising the endpoint rather than lowering it. He also pointed out that maximum yields in refinery operations were not obtained when the low endpoint gasoline was obtained. He predicted that in 10 years the endpoint of the principal domestic grades of gasoline would be raised to 500 degrees Fahrenheit.

Natural Gasoline

Another interesting phase of the motor fuel problem was brought out in the discussion which followed Dr. Roy Cross' paper. Dr. Walter Cross, in answer to questions regarding the antiknock value of natural gasoline, said that tests conducted at their Kansas City laboratory had shown a wide variation.

Some samples had shown a relatively high antiknock value while others were inferior in that characteristic. He said their investigation had not been conclusive enough to reach any definite conclusions but the results to date indicated that natural gasolines from different fields varied in antidetonating characteristics as did gasolines obtained from crudes by the distillation processes.

In this connection he said that natural gasolines from the California fields and certain Mid Continent areas had an exceptionally high antiknock value.

Evil of Substitution

George M. Husser, manager of the Kansas City Better Business Bureau, brought out considerable discussion when he made a report of an investigation regarding the substitution of lubricating oils by irresponsible dealers in Kansas City. A similar investigation was conducted at several other large cities.

In Kansas City, the investigation was confined to garages and other dealers who were suspected of substituting cheaper lubricating oils for a nationally advertised brand. The bureau's investigation showed that 66 per cent of the dealers investigated were guilty of substitution. In making his report he stressed the fact that the investigation was confined to the small distributors, the major distributors not being suspected of substitution. The samples were obtained by asking the dealer for a part of oil of the nationally advertised brand and then taking the samples to the laboratory of the Kansas City Testing Laboratory for a test. Mr. Husser said that similar results had been obtained in the investigations conducted at other cities.

In the discussion which followed, one speaker declared that the manufacturer of the nationally advertised brand was equally guilty of substitution and misrepresentation regarding the product. He said that while the oil was supposed to be a 100 per cent product made from Pennsylvania crude, is was not. Another jobber declared that the company made statements in its advertising which were not true.

Evil Exaggerated

It was apparent from the discussion that in the opinion of the jobbers the substitution evil has been greatly exaggerated in the minds of the public. The opinion was expressed that it was practically confined to relatively few garages and similar type distributors who market only a small part of the total lubricating oil sold.

The remedy suggested for the substitution was for the bulk distributors to keep a very close check on their customers. It was also suggested that new laws were needed to provide penalties for those found guilty of substitution.

Jobbers should pay more attention to their grease sales, according to J. R. Battenfield of the Battenfield Grease & Oil Co., Kansas City. Mr. Battenfield, in a talk on "Increase Your Grease Business," said that there was not only profit from the sale of grease but it also added to the gasoline and lubricating oil business of a distributor for every "grease customer is also a gasoline and oil customer."

He said that at present there was an indifferent attitude on the part of the jobbers which permitted a large part of the grease business to go to garages and other businesses not connected with oil industry. He outlined a sales plan and also explained the different grades of greases and how they are manufactured and utilized.

L. V. Surtees of the Mid-Continent Petroleum Corp., gave a very instructive talk on lubricating oils. He explained the general method of manufacture and also their use in automobiles. The cause of crankcase dilution and other similar problems with which distributors are confronted through their customers was discussed.

Charles M. Sutherland, secretary of the Nebraska Independent Oil Men's Association, delivered the principal address at the luncheon. He made a plea for greater support for the state organizations, pointing out the numerous benefits which accrue to the membership. Several present at the luncheon were called upon for brief talks.

Entertainment Feature

The entertainment feature of the convention was provided by oil companies and supply companies of Kansas City. These companies were hosts at a stag dinner Tuesday night at the Hotel President, which was attended by approximately 500 guests.

AUGUST PRODUCTION LESS THAN YEAR AGO

(Continued from Page 34)

2,279,000 bbls. being an increase over July of 9 per cent. Gas oil, fuel oil and wax stocks continued to increase, these being the only refined products of importance to show increase in stocks during August.

The refinery data of this report were compiled from schedules of 333 refineries, with an aggregate daily crude oil capacity of 2,721,000 bbls. These refineries operated during August at 80 per cent of their capacity as compared with 81 per cent in July.

CHICAGO POST OFFICE CONTRACT IS AWARDED

CHICAGO, Oct. 4.—The motor vehicle department, local service for the Chicago postoffice, has awarded the gasoline contract for the quarter ending December 31, 1926, to the Seneca Petroleum Co., of this city whose bid of 4¾ cents below the tankwagon rate was the lowest. The postoffice department calls for the gasoline at the seller's storage so that the price is for gasoline in the Seneca company's storage. The contract expiring September 30, was held by the Standard Oil Co. of Indiana.

The average requirements are from 70,000 to 75,000 gallons a month but the Christmas rush increases the consumption during December usually about 30 per cent.

REFINING AND MARKETING

FUEL CONSUMPTION IN THE REFINERIES

Petroleum refineries usually are thought of solely as energy producers, but actually they are, in addition, great fuel consumers. It takes energy to produce energy, and the refinery industry probably consumes in excess of one-tenth as much fuel as it produces. Figures recently compiled by the Bureau of Mines show that during 1925 the refineries of the United States in their own operations consumed more than 50,000,000 bbls. of fuel oil, more than 6,000,000 tons of coal, and more than 120,000,000,000 feet of gas. The refining industry therefore ranks with the railroads and the shipping industry as major consumers of oil for fuel.

Although the consumption of coal has increased, the proportion to the total amount of fuel used has decreased. The consumption of coke at refineries in 1919 and 1925 was 320,000 and 314,000 tons respectively. This decrease is surprising in view of greatly increased production causing additions to stock.

Increased use of gas for fuel has compensated the deficit due to coal. The consumption of gas per barrel of oil refined has doubled in the last six years. Accessibility rather than price governs the use of natural gas at refineries and, where possible, the refineries have supplied themselves with gas by means of pipelines to adjacent fields. There has probably been an increase during recent years in the amount of refinery or "incondensable" gas used for fuel. This has been made possible by improvements in refinery practice which now conserves large quantities of gas formerly lost in the air. Such gas saved serves a dual purpose, for it is usually treated in gasoline extraction plants, after which the residue gas is burned as fuel.

Besides the fuel oil which it burns under stills, the petroleum industry uses great quantities of oil, often in the crude state, for field operations, such as drilling and pumping wells, and operating pipelines. Although the final figures for 1925 have not yet been prepared, it is probable that 6,000,000 bbls. of oil were consumed for field purposes during 1925, which amount includes 1,825,000 bbls. of crude petroleum consumed in the operation of pipelines east of California.

UTILITY USE OF OIL INCREASED IN AUGUST

A total of 753,955 bbls. of fuel oil were consumed by public utility electric power plants in the United States during August, according to a monthly report just announced by the division of power resources of the United States Geological Survey. This represented an increase of 7.6 per cent over the preceding month, when 700,884 bbls. were used.

During the same period, the consumption of coal increased only 2.6 per cent, but that of natural gas showed a gain of 9.1 per cent. Fuel oil consumption, as compared with August of 1925, was practically unchanged, there being a reduction of only 200 bbls. daily. However, the use of coal increased 2,500 tons daily and natural gas 16,600,000 feet daily.

NEW JOLIET STATION

CHICAGO, Oct. 4.—The George C. Peterson Co., marketer and distributor of this city, with a string of service stations chiefly in the outlying suburban cities like Waukegan, Joliet and Aurora, has begun the construction of a large combined bulk station, service station, warehouse and local office at Joliet, Ill. The building will be of all cement and steel construction of modern design. Storage for 100,000 gallons will be erected.

ONE-FOURTH MORE OIL BURNERS IN CHICAGO DISTRICT THIS FALL

By J. B. Waldo

CHICAGO, Oct. 2.—A year ago on June 1, a survey made of the number of domestic oil burners that had been installed in Chicago and its immediate suburbs including only those which did not require the service of an attendant and not including the small kerosene burners of the self-installed type showed that 25,235 homes had been equipped with oil burners. A similar survey made as of September 1 this year showed a total of more than 30,000 burners. Allowing for the few burners that have been discontinued and for a number of more or less experimental burners, that is, burners which have not been regularly placed on the market but installed while the apparatus was being observed and perfected, it is a fair assumption that the number of oil burners installed on June 1, 1925, had been increased by September 1, 1926, from 25,000 to 30,000, a gain of 20 per cent.

These estimates correspond closely with reports made by some of the burner organizations for the country. As to the average consumption of furnace oils per burner, the actual results as reported by the distributors of furnace oils differ very materially. The Standard Oil Co., a year ago, estimated the annual consumption per burner at 2,000 gallons but this year it favors a smaller quantity, possibly not more than 1,500 gallons. Other distributors estimate the average requirements of an oil burner at as much as 3,000 gallons, while several active distributors covering a considerable amount of the territory agree that a fair estimate of the annual consumption of furnace oil per burner would be 2,500 gallons with a fairly cold winter, such as during 1925-26. Last winter was not as severe as many winters here from the standpoint of low temperature but it was long and many consumers used their oil burners continuously and freely from October 1 to June 1, so that the individual consumption of furnace oils was probably above the average. Quite a number of individual users of oil burners have been asked as to their own consumption of oil and they have named quantities ranging from 2,300 to 2,700 gallons.

Need 1,000 Cars a Month

On the basis of these figures the requirements of the users of domestic oil burners in Chicago and its immediate suburbs in the way of oil for fuel should range from 45,000,000 to 75,000,000 gallons with an average of 60,000,000 gallons at 2,000 gallons per burner. To supply this quantity would require 7,500 tank cars of oil or more than 1,000 cars a month. The fuel oil required by these burners runs from a light distillate with a gravity of not under 40 degrees down to fuel oil but there are few makes of burners that will operate satisfactorily on an oil with a heavier gravity than 26-28.

In all there are listed seven grades of fuel oil by one of the larger oil companies as required by all the makes of burners for the best use of each. Few, if any, oil distributors carry any such number of grades. Some rely on a good gas oil with a gravity of 32-36 and a distillate with a 38-40 gravity and do not attempt to supply any other grade of furnace oil. The Standard Oil Co., and some of the others supply from their own refineries a single grade of furnace oil consisting of a cracked, dark amber distillate with a gravity of 37-40 and a fairly low flash. For those burners which require a lower flash and higher gravity, they supply kerosene but the consumption of kerosene by these burners is small and decreasing. All other makes of burners will operate on the dark distillate.

To supply the demands from the burner makers for exact gravities and flash points, the custom of blending is greatly resorted to. Some companies do not favor this plan claiming that the practice of blending, say a Smackover crude with gas oil, to develop the required flash and gravity frequently results in trouble as such blends will stratify especially in cold weather and the final result is that the customers' tanks become partly filled with the heavier oil or with a residual oil that is even heavier than the oil with the lowest gravity in the blend. Other oil companies state that properly blended oils give perfect satisfaction and enable the buyer to obtain just the grade the burner needs for best results and at a lower cost than would be possible without blending. The right blending of the oils should be done in heated tanks and the grades thoroughly mixed. Distributors claim that the stratification of the oil can come only when the ingredients are run into a tankwagon and mixed only by the jolting that they receive while on the way to the place of delivery.

One of the peculiar things regarding the business of distributing furnace oils is that none in the business seems willing to admit there is any profit in tank truck distribution of furnace oils. And when the margin between the cost of the oils in the field and the price at which they are sold to the consumer is considered there certainly can be no large profit in this department. A large and successful oil company in a city near Chicago has stated that this department cost the company upwards of $25,000 last winter but it feels obliged to continue it as its regular customers demand the service. The sentiment expressed by some of the largest local companies is about the same. There is no real money in it; they could use the oil to better advantage for other purposes, but their customers expect this service of them and they continue hoping that some day they may be able to operate the department with a wider margin.

PENNZOIL AND BEACON IN NEW YORK MARKET

Pennzoil Co. of New York has announced the sale of its gasoline and kerosene marketing business in New York State to the Beacon Oil Co. of Boston, Mass. It will continue to market lubricating oils in that state as well as furnish motor oils for all the Beacon Oil Co. stations both in New York and the New England States. By terms of the deal the latter company becomes the exclusive distributor of Pennzoil lubricants in New England.

The deal does not affect the Pennzoil distribution of gasoline in Pennsylvania, West Virginia and Ohio, and the company's business in those states still will be supplied with the output of Pennzoil's two refineries at Rouseville and Oil City, Pa. The market for the company in reality has not been curtailed as practically all gasoline sold in New York was purchased from other refiners.

RIVERTON, WYO., REFINERY

CASPER, Wyo., Oct. 4.—It is rumored that the Union Oil Co. of California is preparing to take over the Riverton Refining Co.'s plant at Riverton. The Riverton Refining Co. built the refinery in 1917-18 and expected to operate on crude from the Pilot Butte Field. The wildcatting then going on about Lander and Riverton also boosted the expectations that other fields would be found. The refinery was completed, but as the oil from the Pilot Butte Field was all contracted for by other firms, the new refinery found itself without crude. The plant has been idle.

Tank Wagon Prices In 50 Cities Showed One September Change

Tankwagon prices of gasoline were changed only at a few scattering points in the United States during September and in the table of postings in 50 representative cities compiled by The Oil and Gas Journal only one change was made. For this reason the table, giving all changes during the month, will not be published. The August report appeared in the September 9, issue.

The only change among the 50 cities was a reduction of 2 cents at Dallas on September 3. This brought the average posting in the 50 cities down from 19.587 cents on September 1 to 19.547 cents on October 1. These averages are exclusive of taxes.

Tankwagon prices have been maintained steady despite an almost general softness and declining prices in refined markets. Throughout the Standard Oil Co., of Indiana territory the increasing margin between tank car and tankwagon prices has been especially noticeable.

Pacific coast tankwagon markets have been disturbed by bitter price wars between many distributors but up until the first of the month, the Standard Oil Co. of California had reduced prices only at Los Angeles. As Los Angeles is not among the 50 representative cities, this 3-cent reduction had no effect on the average price in the country on October 1. There also have been several price wars in New York and the New England states, which have forced scattered tankwagon reductions.

Following is the average tankwagon price for the 50 cities on the first day of each month for the past year:

October 1, 1925	15.808
November 1	15.528
December 1	15.763
January 1, 1926	16.133
February 1	16.213
March 1	17.267
April 1	18.517
May 1	18.487
June 1	19.607
July 1	19.697
August 1	19.697
September 1	19.587
October 1	19.547

PACIFIC GASOLINE MERGER COMPLETED

The merger of the Pacific Gasoline Co. with the Standard Oil Co. of California was completed the past week when the natural gasoline interests of the two companies became a unit known as the Standard Gasoline Co. The Standard Oil Co. purchased the Pacific Gasoline Co. last June, but their respective holdings were operated separately until last week.

The ownership of the Standard Gasoline Co. and the Standard Oil Co. of California is identical, the difference being in name only. However, the merger has necessitated numerous changes in the operating organization, particularly in the southern division.

The active management of the Standard Gasoline Co. is in charge of Earle Derby, who prior to his connection with the Standard Oil Co. was manager of field operations of the Pacific Oil Co. at Taft. R. E. Beckly will continue as general superintendent.

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Stills
Agitators
Tanks
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Water Softeners
Absorbers
Wax Pans
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Graver Builds

Tanks
Welded
Riveted
Glass Lined
(Riveted, Inside & Outside Welded)
Structural Supports
Tower Tanks
Standpipes
Any Size Tanks
Erected Anywhere

Refinery Equipment
Jenkins Cracking Process
Stacks-Breechings
General Steel Plate Construction
Water Softeners
Hot Process
Cold Process
Zeolite
Household
Filters—Pressure
Purifying Systems for Swimming Pools

GRAVER Corporation Founded 1857
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Brief Items for Plant Operators

POISONING HAZARDS OF PETROLEUM VAPORS

Information compiled by the Bureau of Mines, in connection with the hazards of persons coming into contact with poisonous petroleum vapors shows that no one type of respiratory appliance can be said to be the best for use in all conditions. Each circumstance must be considered as a problem in itself.

Gas masks, it is pointed out, are simplest, easiest to wear, and least cumbersome but they protect only when the concentrations of noxious gases or vapors in the air are very low. Hose masks protect in any irrespirable atmosphere but they are somewhat cumbersome and the length of the hose limits the distance a wearer may go in fresh air. Self contained oxygen breathing apparatus also protects in any irrespirable atmosphere, but its weight of 38 pounds tends to tire the wearer and it can be used only by trained men and requires frequent attention to insure maintenance in good working condition. This is good for 2 hours' use but there is a smaller equipment, weighing only 17 pounds, good for a half hour.

Except for high-sulphur petroleum and leaded gasoline petroleum vapors are not very poisonous, according to A. C. Fieldner in the statement issued by the Bureau of Mines. About 0.3 per cent of gasoline vapor in air is required to make a man somewhat dizzy in 15 minutes. Individuals vary greatly in their suscepti'bility. As a rule, a man accustomed to breathing the vapors can endure larger percentages; 1.0 to 2.0 pe cent of gasoline vapor will make most men dizzy in 3 to 5 minutes, and will endanger life if continued for one hour or more.

High sulphur crude oils give off poisonous hydrogen sulphide, recognized by its characteristic odor of rotten eggs. As little as 0.005 per cent of hydrogen sulphide has a poisonous effect on men. Men exposed daily to such concentrations suffer irritation of the eyes and respiratory tract. Dogs exposed to 0.06 to 0.08 per cent are affected almost immediately and collapse suddenly. Although very low percentages are recognized at once by the strong odor, high percentages are often not recognized by the unfortunate victim because the first whiff paralyzes the olfactory nerve. The high-sulphur Mexican oil has given much trouble from hydrogen-sulphide poisoning in the transportation, storage, and refining of this oil. As a rule the still gases are laden with this poisonous constituent.

CRUDE OIL MOTORS TESTED IN GERMANY

Considerable success is being attained in Germany in experiments with simplified crude oil motors, according to a late report of the Department of Commerce at Washington. Robert Bosch Aktiengesellschaft of Stuttgart, Germany, has acquired the sole rights of utilizing patents and has been carrying on experiments with the assistance of the inventing engineer for 18 months to bring the improved crude oil motor to a practical stage of construction.

It is stated the price of this new engine will be higher than a gasoline motor but the saving in fuel will more than offset the difference.

NEW GAS LINE TO PARCO

CASPER, Wyo., Oct. 4.—Hope Engineering Co. is laying a new gas line for the Producers & Refiners Corp. extending from the Parco refinery of the Producers & Refiners Corp. to the Mahoney Dome. The line will supply the refinery with fuel.

FRACTIONATE CRUDE PARAFFIN

DALLAS, Tex., Oct. 4.—Much time is being devoted by engineers attached to the Dallas field office of the Bureau of Mines in fractionating samples of crude paraffin taken from wells in Hutchinson County in the Panhandle. It is intended to fractionate samples of "paraffin" from a number of fields and compare the index of refraction, melting point and carbon-hydrogen ratio of each fraction. The percentage of asphalts, asphaltenes, oil and different fractions of wax in each sample will be determined.

DISMANTLING KANSAS AND WYOMING PLANTS

The Continental Oil Co. is dismantling its refineries at Chanute, Kans., and Cowley, Wyo. Both plants have been shut down for some time. The Chanute plant became a part of the Continental when the Mutual Oil Co. was taken over two years ago.

Before the Mutual ownership, the plant was known as the Kansas Co-Operative Co.'s refinery. The refinery had one of the first centrifugal installations for the manufacture of lubricating oils in the Mid-Continent Field. The skimming capacity of the plant was 2,000 bbls. The Cowley refinery was a small skimming plant. It was one of the oldest plants in Wyoming. Part of the equipment from these plants is being moved to other refineries.

The company has had under consideration for some time the building of a lubricating oil plant at the Wichita Falls, Tex., refinery of the Texhoma Oil & Refining Co., a subsidiary organization, but no definite decision has been made. In addition to the Wichita Falls refinery, the company has refineries operating at Sapulpa, Okla., Farmington, N. Mex., Artesia, N. Mex., Glenrock, Wyo., and Florence, Colo.

MANHATTAN TO BUILD SECOND KANSAS PLANT

The Manhattan Oil Co. of Kansas City, Mo., last week started construction of its second natural gasoline plant in Kansas. The plant which will have a capacity of 10,000 gallons daily is in the NW of Section 12-22-10e, 6 miles west of Madison. The plant will be of the absorption type.

A loading rack will be built on the Missouri Pacific at Madison with pipeline connections to the plant. The company recently completed an 8,000-bbl. oil absorption plant in the Greenwood Pool of Kansas.

PARAGON REFINERY CONTRACT

The contract for the engineering and designing and provision and erection of all material in the enlargement program of the Paragon Refining Co's plant at Toledo, Ohio, is being executed by the Widdell Engineering Co. and Arthur G. McKee & Co., associated corporations.

REGINA REFINERY PROGRAM

Improvements costing $500,000 will be made at the Regina, Canada, refinery of the Imperial Oil Co. before January 1. New equipment to handle crude from Montana will be among the improvements.

AMONG THE TECHNICAL MEN

A technical man who has gained national recognition because of what he has done in developing and patenting various improvements in refining methods and cracking processes is Dr. Sidney Borne, assistant general superintendent of the refining departmet of the Transcontinental Oil Company. He is a pioneer in the development of by-products from petroleum such as the higher alcohols and has done much research work along that line.

Dr. Sidney Borne

Doctor Borne has been with the Transcontinental Oil Company in his present capacity since 1919, his offices being at Muskogee until the first of this year when the three divisions of the company were consolidated at Tulsa.

Previous to joining the Transcontinental, Doctor Borne was chief chemist for the Empire companies with offices at Bartlesville, a position which he had held since the latter part of 1915, and before that chief chemist for the Rittman Process Corporation at Pittsburgh, Pa.

Following his graduation from university in 1913, and until he became associated with the Rittman Process Corporation, Doctor Borne engaged in research work along various lines, working out of New York City and St. Louis. He is a graduate of Columbia University, New York, from which school he earned a bachelor of science degree in 1910, and a doctor of philosophy degree in 1913.

Doctor Borne is a member of the American Chemical Society, the Chemists' Club of New York and Sigma Xi and Phi Lambda Upsilon, national honorary scientific societies. He is a native of New York City.

REFINERY AT CRAIG STARTS THIS WEEK

By C. O. Willson
Refinery Editor

CASPER, Wyo., Oct. 4.—The new refinery of The Texas Company at Craig, Colo., will start operation this week. The plant will handle the production of the Moffat Pool, which is located 15 miles south of Craig. The present production of the pool is 3,500 bbls. daily. It is expected the small production of The Texas Company in the Tow Creek Field, about 50 miles west of Craig, will also be brought to the plant by tank car. The plant is connected by a 4-inch line with the Moffat Pool. This line formerly belonged to the Prairie Pipe Line Co. The new refinery has a pipe still for the skimming operation and two Holmes-Manley units for cracking. Provision has been made for the installation of two more cracking units if needed later.

The Texas Company now has 12 refineries in operation, including the Kentucky plant recently taken over from the Great Southern Refining Co. These 12 plants have a crude capacity in excess of 100,000 bbls. daily. In number of plants, the company now has more than any other single company.

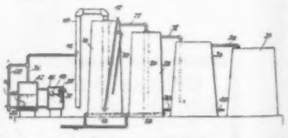
ABSORPTION PLANT IN DE SOTO PARISH

SHREVEPORT, La., Oct. 4.—The National Gas Products Corp. of Los Angeles, Calif., is completing a one-unit absorption gasoline plant in DeSoto Parish, Louisiana. The plant is capable of making 3,500 gallons daily. National's own equipment was installed in the plant under the supervision of the company's chief engineer, R. L. James.

The company recently entered the Louisiana-Arkansas territory with division offices in Shreveport. The gas interests of the company are in charge of W. J. Anson while Mr. James has charge of construction and operations.

Recent Patents

1,597,700. Breaking of Oil-Water Emulsions. John Charles Walker, Eldorado, Kans., assignor to Doherty Research Co., New York, N. Y., a corporation of Delaware. Filed December 5, 1921. Serial No. 519,844. 8 Claims. (Cl. 196—4.)



3. A method of treating petroleum oil containing an emulsion of oil and water comprising mixing formaldehyde and steam with the body of oil.

1,597,461. Method of Dehydrating Oil Emulsions. Ralph A. Halloran, Berkeley, Calif., assignor to Standard Oil Co., San Francisco, Calif., a corporation of California. Filed June 11, 1925. Serial No. 36,554. 4 Claims. (Cl. 196—4.)

3. The method of dehydrating mineral oil emulsions, which comprises adding to the emulsion substantially .5 per cent per volume of a sulfonated sludge obtained from refining lamp oil distillates with fuming or concentrated sulfuric acid and heating the mixture to 175 degrees F.

(Additional Patents on Page 364)

Excessive Pressure Impossible—

when controlled by a Type 14, Fisher Automatic Relief Valve.

The illustration shows an installation on the absorber towers in the Hull Gasoline Plant, at Winfield, Kansas, where a Fisher Type 14 maintains a pressure of 40 pounds that is always constant.

We recommend this automatic relief valve on any installation where a desired pressure must be maintained exactly and any excess pressure at a determined point relieved.

The valve is absolutely automatic, opening at the fixed working pressure and closing promptly after relieving the excess pressure above the working point, so that, except within the narrowest working limits, the pressure never exceeds the point for which it is set.

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REFINERY AND CRUDE PRICES

Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields

GASOLINE AND NAPHTHA

	Oct. 5		Sept. 28		Sept. 21	
OKLAHOMA (Group 3)—						
50 52 450 end point (Naphtha)	.09⅞	.10	.10	.10¼	.10½	
56-58 450 end point	.09¾		.10	.10¼	.10¼	.10⅜
58-60 450 end point	.09¾	.10	.10⅛	.10¼	.10⅜	.10½
58-60 437 end point (U. S. Motor)	.10	.10¼	.10¼	.10½	.10½	.10⅝
60-62 400 end point	.10½	.10¾	.10¾	.11	.11	.11¼
64-66 375 end point	.10⅞	.11	.11	.11¼	.11½	.11⅝
68-70 360 end point	.11¾	.12	.11¾	.12	.12	.12⅛
KANSAS—						
58-60 437 end point (U. S. Motor)	.10½	.10¾	.10¾	.10⅞	.11	.11¼
NORTH TEXAS—						
48 50 450 end point (Naphtha)	.09¾	.10	.10		.10⅜	.10½
50-52 450 end point (Naphtha)	.09¾	.10	.10	.10⅛	.10⅜	.10½
56-58 450 end point	.09¾		.10	.10⅛	.10⅛	.10⅜
58-60 437 end point (U. S. Motor)	.10	.10⅛	.10⅛	.10⅜	.10⅜	.10⅝
60-62 400 end point	.10⅜	.10½	.10⅝	.10¾	.10⅞	.11⅛
64-66 390 end point	.10½	.10¾	.10¾	.10⅞	.11¼	.11⅜
64-66 375 end point	.10⅝	.10⅞	.10⅞	.11⅛	.11⅜	.11½
68-70 360 end point	.11¼		.11¾		.12	
NORTH LOUISIANA—						
58-60 437 end point (U. S. Motor)	.10¼	.10⅜	.10¼	.10¾	.10⅞	.11
ARKANSAS—						
58 60 437 end point (U. S. Motor)	.10¼	.10⅜	.10¼	.10½	.10⅞	.11⅛
ROCKY MOUNTAIN STATES—						
*58-60 437 end point (U. S. Motor)	.13	.13¼	.13¼	.13½	.13½	.13¾
PENNSYLVANIA—						
52 Naphtha	.12¼	.12½	.12½	.12⅝	.12½	.12¾
54 Naphtha	.12½	.12⅝	.12⅝	.12⅞	.12¾	.13
56 Gasoline	.12½	.12¾	.12¾	.13	.13	.13¼
58 Gasoline	.12⅝	.13	.13	.13¼	.13¼	.13½
60 Gasoline	.13¼	.13½	.13¼	.13½	.13½	.13¾
62 Gasoline	.14	.14¼	.14	.14¼	.14½	.14¾
64 Gasoline	.14½	.14¾	.14½	.14¾	.14¾	.15
66 Gasoline	.15½	.15¾	.15½	.15¾	.15¾	.16
68-70 Gasoline	.17⅝	.17¾	.17⅝	.17¾	.17¾	.18
CALIFORNIA—						
54-58 437 end point (U. S. Motor) domestic	.12	.12½	.12	.12½	.12	.12½
CHICAGO DISTRICT (Based on Group 3)—						
50-52 450 end point (Naphtha)	.10		.10¼	.10½	.10½	
56-58 450 end point	.09⅞	.10	.10¼		.10¼	.10½
58-60 437 end point (U. S. Motor)	.10⅛	.10¼	.10⅜	.10½	.10⅜	.11
60-62 400 end point	.10¾	.10⅞	.11	.11¼	.11¼	.11½
64 66 375 end point	.11¼	.11⅜	.11½	.11¾	.11¾	.12
68-70 360 end point	.11⅞	.12	.12		.12	.12¼

*Colorado points.

NATURAL GASOLINE

	Oct. 5		Sept. 28		Sept. 21	
OKLAHOMA (Group 3)—						
Grade AA, 80-87.9, 375 e.p., rec. 90%	.09¼		.09⅝	.09¾	.10¼	
Grade A, 72-79.9, 375 e.p., rec. 90%	.09½		.09⅝	.09¾	.10¼	
Grade BB, 84-92, 375 e.p., rec. 85%	.09	.09¼	.09⅜	.09½	.10	.10⅛
Grade B, 76-83.9, 375 e.p., rec. 85%	.09	.09¼	.09⅜	.09½	.10	.10⅛
Grade C, 80-90, 375 ep., rec. 78%	.09		.09¼		.09¾	.09⅞
NORTH TEXAS—						
Grade AA, 80-87.9, 375 e.p., rec. 90%	.09½		.09¾		.10¼	
Grade A, 72 79.9, 375 e.p., rec. 90%	.09½		.09¾		.10¼	
Grade BB, 84-92, 375 e.p., rec. 85%	.09	.09⅛	.09⅜	.09½	.10	.10⅛
Grade B, 76-83.9, 375 e.p., rec. 85%	.09	.09¼	.09⅜	.09½	.10	.10⅜
Grade C, 80-90, 375 e.p., rec. 78%	.09		.09¼		.09¾	.10
NORTH LOUISIANA—						
Grade A, 72-79.9, 375 e.p., rec. 90%	.10¼	.10⅜	.10½	.10⅝	.10⅜	.11
Grade B, 76-83.9, 375 e.p., rec. 85%	.10⅛	.10¼	.10⅜	.10½	.10⅝	.10¾
Grade C, 80-90, 375 e.p., rec. 78%	.10	.10¼	.10¼	.10½	.10½	.10⅞
CALIFORNIA—						
75-85, 375-390 end point	.15½	.16	.15½	.16	.15½	.16
CHICAGO DISTRICT (Based on Group 3)—						
Grade AA, 80 87.9, 375 e.p., rec. 90%	.09¾		.09¾	.10	.10¼	.10⅜
Grade A, 72-79.9, 375 e.p., rec. 90%	.09¾		.09¾	.10	.10¼	.10⅜
Grade BB, 84-92, 375 e.p., rec. 85%	.09¼	.09⅜	.09½	.09¾	.10	.10⅛
Grade B, 76-83.9, 375 e.p., rec. 85%	.09¼	.09⅜	.09½	.09¾	.10	.10⅛
Grade C, 80-90, 375 e.p., rec. 78%	.09	.09¼	.09¼	.09½	.09¾	.09⅞

MOTOR NATURAL GASOLINE

	Oct. 5		Sept. 28		Sept. 21	
OKLAHOMA (Group 3)—						
60-62 450 end point	.09¾	.10	.10		.10¼	
64-66 437 end point	.10		.10⅛	.10¼	.10¼	.10⅜
NORTH TEXAS—						
64 66 437 end point	.09¾	.10	.10⅛	.10¼	.10¼	
PENNSYLVANIA—						
*60-62	.12¼	.12½	.13	.13¼	.13	.13¼
*64-66	.12½	.12¾	.13¼	.13½	.13¼	.13½
*66-68	.12¾	.13	.13½	.13¾	.13½	.13¾
*68-70	.12¾	.13	.13½	.13¾	.13½	.13¾
CHICAGO DISTRICT (Based on Group 3)—						
60-62 450 end point	.10		.10		.10¼	
64 66 437 end point	.10¼		.10¼		.10½	

*At Sistersville, W. Va.

BURNING OIL

	Oct. 5		Sept. 28		Sept. 21	
KANSAS—						
41-43 water white Kerosene	.08	.08½	.08½	.08¾	.09	.09¼
OKLAHOMA (Group 3)—						
41-43 water white Kerosene	.07¼	.07½	.07¾	.08¼	.08⅝	.08¾
42-44 water white Kerosene	.07¾	.08	.08⅜	.08½	.09¼	.09½
NORTH LOUISIANA—						
41-43 prime white Kerosene	.08¼	.08½	.09	.09¼	.09¼	.09½
ROCKY MOUNTAIN STATES—						
*40-41 water white Kerosene	.10¼	.10½	.10¾	.11	.11⅝	.11¾
NORTH TEXAS—						
41-43 water white Kerosene	.07⅛	.07¼	.07¾	.08	.08¼	.08½
ARKANSAS—						
41-43 water white Kerosene	.08¼	.08½	.09	.09¼	.09¼	.09½
PENNSYLVANIA—						
43 Kerosene prime white	.09¾	.10	.09¾	.10	.09¾	.10
45 Kerosene water white	.09¾	.10	.10	.10¼	.10	.10¼
46 Kerosene water white	.10¼	.10½	.10¼	.10½	.10¾	.11
47 Kerosene water white	.10¾	.11	.10¾	.11	.11	.11
34 Neutral	.07½	.07¾	.07½	.07¾	.07½	.07
34 Sundebloom Neutral	.08½	.08¾	.08½	.08¾	.08½	.08
36 Miners' Neutral	.07¼	.07½	.07¼	.07½	.07¼	.07
300 Mineral Seal	.08½	.08⅝	.08¼	.08½	.08¼	.08
CALIFORNIA—						
38-40 water white (high burning test)	.07⅛	.08	.07½	.08	.07½	.08
Engine distillate, 43-45 445 end point	.09¾	.10	.09¾	.10	.09¾	.10
Engine distillate, 42-44 480 end point	.09¼	.09½	.09¾	.09½	.09¼	.09
CHICAGO DISTRICT (Based on Group 3)—						
41 43 water white Kerosene	.07¼	.07⅜	.08	.08¼	.08¾	.09
42-44 water white Kerosene	.07⅞	.08	.08½		.09½	.09

*Colorado points.

FUEL OILS

	Oct. 5		Sept. 28		Sept. 21	
KANSAS—						
24-26 Fuel Oil	1.50		1.50		1.50	1.55
32-36 Gas Oil	.04⅝	.04¾	.04⅝	.04¾	.04⅝	.04
38-40 Distillate	.05⅞	.06	.05⅞	.06	.05⅞	.06
OKLAHOMA (Group 3)—						
Below 22 Fuel Oil (sellers' cars)	1.25	1.30	1.27½	1.30	1.30	1.32
22-26 Fuel Oil (sellers' cars)	1.30	1.35	1.32½	1.35	1.35	
24-26 Fuel Oil (sellers' cars)	1.35	1 40	1.37½	1.40	1.40	1.42
26-30 Fuel Oil (sellers' cars)	1.45	1.47½	1.45	1.50	1.50	1.55
28 30 Fuel Oil (sellers' cars)	1.52½	1.55	1.55	1.60	1.57½	1.60
32 36 Gas Oil (cracking stock)	.04⅛	.04⅜	.04⅛	.04⅛	.04⅛	.04
36-38 Distillate	.05⅜	.05½	.05⅜	.05⅝	.05⅜	.05
38-40 Straw Distillate	.05⅝	.05⅞	.05⅝	.05⅞	.05⅝	.06
NORTH TEXAS—						
24-26 Fuel Oil (sellers' cars)	1.45		1.45		1.45	1.47
32-36 Gas Oil (straw)	.04	.04⅛	.04	.04¼	.04⅛	.04
38-40 Straw Distillate	.05⅜	.05⅝	.05⅜	.05⅞	.05⅜	.05
NORTH LOUISIANA—						
18-20 Fuel Oil	1.27½	1.30	1.27½	1.30	1.35	
32-36 Gas Oil (straw)	.04⅛	.04⅜	.04¼	.04½	.04¾	.05
32-36 Gas Oil (dark)	.04	.04¼	.04	.04¼	.04½	.04
36-38 Distillate	.05	.05¼	.05	.05⅛	.05	.05
ARKANSAS—						
38-40 Distillate	.05½	.05¾	.05½	.05¾	.05½	.05
32-36 Gas Oil (straw)	.04¼		.04¼	.04½	.04½	.04
16 20 Refinery Fuel Oil	1.25		1.25		1.25	
GULF COAST (South Texas)—						
Gas Oil	.05½	.05⅝	.05½	.05⅝	.05⅝	.05
Fuel Oil	1.75	1.85	1.75	1.85	1.75	1.85
PENNSYLVANIA—						
30-34 Fuel Oil	.05¾	.06	.06	.06¼	.05¾	.05
36-40 Fuel Oil	.06½	.06¾	.06½	.06¾	.06½	.06
CALIFORNIA—						
33-36 Distillate	.04	.04¾	.04	.04¾	.04	.04
27-32 Distillate	.03¾	.04	.03¾	.04	.03¾	.04
15-20 Fuel Oil (at tide water)	1.00	1.04	1.00	1.04	1.00	1.04
27 plus Diesel	1.15	1.19	1.15	1.19	1.15	1.19
CHICAGO DISTRICT (Based on Group 3)—						
24-26 Fuel Oil (sellers' cars) Group 3	1.40	1.45	1.40	1.45	1.42½	1.45
22-26 Fuel Oil (sellers' cars) Group 3	1.35	1.40	1.35	1.40	1.37½	1.42
18-22 (Group 3)	1.27½	1.32½	1.30	1.35	1.35	1.37
18 20 (Smackover)	1 27½	1.30	1.27½	1.32½	1.25	1.30
32-36 Gas Oil	.04⅜	.04¼	.04⅜	.04¼	.04⅛	.04
36-38 Distillate	.05¼	.05½	.05½	.05¾	.05½	.05
38-40 Straw Distillate	.05¾	.06	.05¾	.06	.05¾	.06

LUBRICATING OILS AND WAX

	Oct. 5		Sept. 28		Sept. 21	
OKLAHOMA (Group 3)—						
70-80 vis., 2½ color, 20-25 cold test	.06	.07	.06	.07	.06	.07
100 vis., 2 color, 20-25 cold test	.07	.07½	.07	.07½	.07	.07
100 vis., 3 color, 20-25 cold test	.06½	.07	.06½	.07	.06½	.07
150 vis., 3 color, 20-25 cold test	.09½	.10	.09½	.10	.09½	.10
150 vis., 4 color, 20 25 cold test	.09¾		.09¾		.09¾	
180 vis., 3 color, 23-28 cold test	.10½	.11½	.10½	.11½	.10½	.11
180 vis., 4 color, 23-28 cold test	.10	.10½	.10	.10½	.10	.10
200 vis., 3 color, 23-28 cold test	.10⅜	.12¼	.10⅜	.12¼	.10⅜	.12
200 vis., 4 color, 23-28 cold test	.11¼	.11½	.11¼	.11½	.11¼	.11
220 vis., 3 color, 25-30 cold test	.13	.13½	.13	.13½	.13	.13
220 vis., 3 color, 25-30 cold test	.13		.13		.13	
240 vis., 3 color, 25-30 cold test	.14	.15	.14	.15	.14	.15
240 vis., 4 color, 25-30 cold test	.14	.14½	.14	.14½	.14	.14
280 vis., 3 color, 25 30 cold test	.16	.17	.16	.17	.16	.17
280 vis. ,4 color, 25-30 cold test	.15½	.16½	.15	.16½	.15½	.16
180 vis., 5 color, 23-28 cold test	.09¾	.10¼	.09¾	.10¼	.09¾	.10
200 vis., 5 color, 23-28 cold test	.10	.11¼	.10	.11¼	.10	.11
220 vis., 5 color, 25-30 cold test	.12	.12¼	.12	.12¼	.12	.12
240 vis., 5 color, 25-30 cold test	.13	.14	.13	.14	.13	.14
280 vis., 5 color, 25-30 cold test	.15	.16	.15	.16	.15	.16
Cylinder Stocks:						
600, steam refined, dark green	.08	.11	.08	.11	.08	.11
600, steam refined, light green	.06	.07	.06	.07	.06	.07
190-200 vis. @ 210 "D" Bright Stock	.33	.35	.33	.35	.33	.35
150 vis. @ 210 "D" Bright Stock	.28	.31	.28	.31	.28	.31
200-210 vis. @ 210 "E" Bright Stock	.30	.31	.30	.31	.30	.31
150 vis. @ 210 "E" Bright Stock	.27	.28	.27	.28	.27	.28
Waxes:						
124 126 White Crude Scale Wax	.04¾		.04¾		.04¾	
PENNSYLVANIA—						
150, 3 color	.23		.23¼		.23¼	
180, 3 color	.26½		.26½		.26½	
200, 3 color	.28½		.30		.29	
220, 3 color	.31		.31		.31	
600, steam refined	.12¼		.12¼		.12½	
635, steam refined	.15½		.15½		.15½	
650, steam refined	.17		.17		.17¼	
600, Pennsylvania flash	.21		.21		.21	
630, Pennsylvania flash	.32½		.32½		.32½	
*550, E filtered	.19		.19		.19	
600, E filtered	.21½		.21½		.21½	
*600, E filtered	.21½		.21½		.21½	
600, D filtered	.27		.27		.27	

REFINERY AND CRUDE PRICES

Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields

350, E filtered	.18		.18		.18	
350, D filtered	.22		.22		.22	
Pennsylvania Bright Stock	.41½		.41½		.41½	
122-124 White Crude Scale Wax	.05¼	.05¼	.05⅛	.05¼	.05¼	.05⅜
†124-126 White Crude Scale Wax	.05¼	.05½	.05¼	.05½	.05½	.05¾

*At Warren, Pa. †At New York City.

GULF COAST (South Texas)—						
Zero Black	.06	.07	.06	.07	.06	.07
No. 2 color, 100 vis., pale oil	.08½	.09	.08½	.09	.08½	.09
No. 3 color, 200 vis., pale oil	.11	.12	.11	.12	.11½	.12
No. 3½ color, 300 vis., pale oil	.12	.13	.12	.13	.12½	.13
No. 3¾ color, 500 vis., pale oil	.14	.15	.14	.15	.14	.14½
No. 4 color, 750 vis., pale oil	.17	.18	.17	.18	.17½	.18½
No. 2 plus color, 200 vis., pale filtered	.21½		.21½		.21½	
No. 2 color, 300 vis., pale filtered	.24½		.24½		.24½	
No. 2½ color, 500 vis., pale filtered	.27½		.27½		.27½	
No. 2½ color, 750 vis., pale filtered	.35½		.35½		.35½	
No. 5 to 6 color, 200 vis., red oil	.10	.10½	.10	.10½	.10	.10½
No. 5 to 6 color, 300 vis., red oil	.11½	.12	.11½	.12	.11½	.12
No. 5 to 6 color, 500 vis., red oil	.12½	.13	.12½	.13	.12½	.13
No. 5 to 6 color, 750 vis., red oil	.16	.17	.16½	.17	.16½	.17
CALIFORNIA—						
130 vis., 2½-3 color	.10	.11½	.10	.11½	.10	.11½
200 vis., 2½-3 color	.13½	.14½	.13½	.14½	.13½	.14½
300 vis., 3 -3½ color	.15	.16	.15	.16	.15	.16
350 vis., 3½-4 color	.15½	.17½	.15½	.17½	.15½	.17½
400 vis., 3½-4 color	.18	.19	.18	.19	.18	.19
Red Neutrals:						
200 vis., 3½-5 color	.12	.13	.12	.13	.12	.13
300 vis., 5 -6 color	.13	.14	.13	.14	.13	.14
400 vis., 5 -6 color	.15	.16	.15	.16	.15	.16
500 vis., 4½-5 color	.18	.19	.18	.19	.18	.19
500 vis., 6 -6½ color	.16	.17	.16	.17	.16	.17
600 vis., 6½ plus color	.17	.18	.17	.18	.17	.18

Note: Bright stocks are not manufactured commercially on the Pacific Coast.

NEW YORK (BAYONNE) REFINERY PRICES

	Oct. 5	Sept. 28	Sept. 21
Gasoline:			
U. S. Motor, 58-60 437	.13	.13	.13
Export, 64-66 375	.14½	.15	.15
Kerosene, prime white, 41-43	.10½	.10⅞	.11
*Bunker Oil "C" 14 16, per bbl.	1.65	1.75	1.75
*Diesel Oil, 28-30, per bbl.	2.50	2.50	2.50
Gas Oil, 28 plus	.06¾	.06¾	.06¾
Furnace Oil (tankwagon)	.12	.12	.12
Cylinder Oil, light filtered, 600 s.r.	.29	.29	.29
Bright Stock, No. 5, 150 vis., at 212 F.	.42	.42	.42
White Neutral, No. 1, 170 vis., 1 color	.37	.37	.37
Spindle Oil, No. 1 red, 230 vis., 5½ color	.17½	.17½	.17½
Pale Oil, "25," 170 vis., 3½ color	.13	.13	.13
Pale Oil, "28," 100 vis., 2 color	.08	.08	.08
Red Oil:			
No. 3, 160 vis., 7 color	.11	.11	.11
No. 2, 212 vis., 5½ color	.12	.12	.12
No. 1, 265 vis., 5½ color	.13½	.13½	.13½
Polar, 295 vis., 6 color	.14	.14	.14
Paraffin Wax, refined:			
120-122 a.m.p., per lb.	.05⅞	.05⅞	.05⅞
125-127 a.m.p., per lb.	.06	.06	.06
130-132 a.m.p., per lb.	.06½	.06½	.06½
135-137 a.m.p., per lb.	.06¾	.06¾	.06¾
Petrolatum, in bbls., per lb.:			
Dark green	.02	.02	.01⅞
Amber	.03¼	.03¼	.03¼
Cream	.05¾	.05¾	.05¾
Lily white	.07⅞	.07⅞	.07⅞
Snow white	.08¾	.08¾	.08¾

*Lighterage 5.5c a barrel extra.

NEW YORK CASE EXPORT PRICES

	Oct. 5	Sept. 28	Sept. 21
Gasoline, U. S. Motor, 58-60	.27.90	.28.40	.28.90
Kerosene:			
Standard white Kerosene	.19.15	.19.65	.19.65
Water white Kerosene	.20.65	.21.15	.21.15

LOS ANGELES EXPORT PRICES

	Oct. 5		Sept. 28		Sept. 21	
Kerosene water white	.05½	.06½	.05½	.06½	.05½	.06½
U. S. Motor Gasoline, 54-56 437 e.p.	.10	.10½	.10	.10½	.10	.10½

CRUDE OIL PRICES

OKLAHOMA, KANSAS AND NORTH TEXAS

***Prairie Oil & Gas Co.**

(Oklahoma, Kansas and North and East Central Texas)

(Effective May 15)

28° to 28.9°	$1.65
29° to 29.9°	1.73
30° to 30.9°	1.81
31° to 31.9°	1.89
32° to 32.9°	1.97
33° to 33.9°	2.05
34° to 34.9°	2.13
35° to 35.9°	2.21
36° to 36.9°	2.29
37° to 37.9°	2.37
38° to 38.9°	2.45
39° to 39.9°	2.53
40° to 40.9°	2.61
41° to 41.9°	2.69
42° to 42.9°	2.77
43° to 43.9°	2.85
44° to 44.9°	2.93
45° to 45.9°	3.01
46° to 46.9°	3.09
47° to 47.9°	3.17
48° to 48.9°	3.25
49° to 49.9°	3.33
50° to 50.9°	3.41
51° to 51.9°	3.49
52° and above	3.57

*Other major purchasers except as noted below.

Humble Oil & Refining Co.

(Effective May 15)

(North and East Central Texas, Ranger,, Mexia, Powell, Richland, Wortham, Currie, Moran, Big Lake, Nacona and Lytton Springs)

Same prices as Prairie Oil & Gas Co. schedule. Postings below 28° gravity 8 cents less for each degree, effective June 21.

Magnolia Petroleum Co.

(Effective May 15)

(Oklahoma, Kansas and North and East Central Texas, except Corsicana heavy, and Lytton Springs of South Central Texas)

Below 28°	$1.30
Other grades same as Prairie Oil & Gas Co.	
Iatan	$1.15
Corsicana heavy	1.25
Panola County:	
30° to 34.9°	$1.95
35° to 37.9°	2.10
38° and above	2.25

TEXAS PANHANDLE

Humble Oil & Refining Co.

(Effective Sept. 22)

Carson-Hutchinson Counties	$1.25
Other Fields—	
(Effective June 21)	
39° to 39.9°	$1.90
40° to 40.9°	1.95
41° to 41.9°	2.00
42° to 42.9°	2.05
43° to 43.9°	2.10
44° and above	2.15

Grades above 39° gravity same as posted by the Kay County Gas Co.

Kay County Gas Co.

Magnolia Petroleum Co.

All Fields	$1.25

Note: Magnolia Petroleum Co. prices effective September 22, and Kay County Gas Co., October 4.

WEST TEXAS

Crane-Upton Counties (Sept. 15)

Below 26°	$ .80
26° to 26.9°	.85
27° to 27.9°	.90
28° to 28.9°	.95
29° to 29.9°	1.00
30° to 30.9°	1.05
31° to 31.9°	1.10
32° to 32.9°	1.15
33° to 33.9°	1.20
34° to 34.9°	1.25
35° to 35.9°	1.30
36° and above	1.35

GULF COAST

***Humble Oil & Refining Co.**

(Effective August 30)

Grade A	$1.40
Grade B—	
Below 25°	1.40
25° to 25.9°	1.45
26° to 26.9°	1.50
27° to 27.9°	1.55
28° to 28.9°	1.60
29° to 29.9°	1.65
30° to 30.9°	1.70
31° to 31.9°	1.75
32° to 32.9°	1.80
33° to 33.9°	1.85
34° to 34.9°	1.90
35° and above	1.95
Spindletop	
Grade A	$1.25
Grade B—	
Below 25°	1.25
25° to 25.9°	1.30
26° to 26.9°	1.35
27° to 27.9°	1.40
28° to 28.9°	1.45
29° to 29.9°	1.50
30° to 30.9°	1.55
31° to 31.9°	1.60

*All major purchasers except as noted below. Sun Pipe Line Co. prices effective September 1.

The Texas Company

(Effective August 30)

Grade A	$1.40
Grade B	1.40
†Light Crude—	
35° to 35.9°	1.95
36° to 36.9°	2.00
37° to 37.9°	2.05
38° to 38.9°	2.10
39° to 39.9°	2.15
40° and above	2.20

†The Texas Company's postings on light crude under 35° gravity are same as Humble Oil & Refining Co.'s grades and prices for Grade B crude. Spindletop prices same as for Humble Oil & Refining Co., but classified according to The Texas Company's general schedule to 31° to 31.9° crude.

SOUTH CENTRAL AND SOUTHWESTERN TEXAS

***Magnolia Petroleum Co.**

Luling (contract) (Eff. May 18)	$1.30
Mirando (Webb, Jim Hogg and Zapata Counties) (May 15)	1.25
Rockdale-Minerva (Milam County)	1.25
Thrall	1.00
Callihan (Live Oak and McMullen Counties) (May 15)	1.75
†Lockhart (Lytton Springs)	
Somerset (Grayburg Pipe Line Co.):	
(Effective May 17)	
28° to 28.9°	$1.25
29° to 29.9°	1.35
30° to 30.9°	1.71
31° to 31.9°	1.89
32° to 32.9°	1.97
33° to 33.9°	2.05
34° to 34.9°	2.13
35° to 35.9°	2.20
36° to 36.9°	2.29
37° to 37.9°	2.37
38° and above	2.45

*Texpata Pipe Line Co. and Humble Pipe Line Co. also post in Mirando Field.

†Lockhart prices same as for North and East Central Texas. Lockhart posted by Magnolia Petroleum Co. and Humble Oil & Refining Co.

ARKANSAS AND NORTH LOUISIANA

Standard Oil Co. of Louisiana

(Effective May 18)

Caddo:	
Below 26° (July 24)	$1.40
26° to 28.9° (July 24)	1.55
29° to 31.9° (July 24)	1.70
32° to 34.9°	2.25
35° to 37.9°	2.35
38° and above	2.45
Homer below 31°	1.85
31° to 32.9°	2.00
33° to 34.9°	2.10
35° and above	2.20
Haynesville below 33°	2.00
33° and above	2.10
El Dorado below 33°	2.00
33° to 34.9°	2.10
35° to 36.9°	2.20
37° and above	2.30
Bull Bayou, 32° to 34.9°	1.95
35° to 37.9°	2.10
38° and above	2.25
Cotton Valley	1.20
DeSoto	2.30
Crichton	2.10
Bellevue	1.40
Smackover, below 24°	1.10
24° to 24.9°	1.35
25° to 25.9°	1.40
26° to 26.9°	1.45
27° and above	1.50
*Stephens, Ark., below 26°	1.45
26° and above	1.65
†Calion (East El Dorado)	1.10
‡Urania (August 26)	1.10

Other companies posting in these fields are: Gulf Pipe Line Co.; Atlantic Oil Producing Co. in Homer, Haynesville, El Dorado and Smackover. The Texas Company in Caddo, Bull Bayou, DeSoto, Crichton and Smackover.

*Posted by the Atlantic Oil Producing Co. †Posted by the Gulf Pipe Line Co. ‡Posted by the Louisiana Oil Refining Corp.

ROCKY MOUNTAIN STATES

Ohio Oil Co.—Midwest Refining Co.

(Effective May 17)

Rock Creek (Wyo.)	$2.25
Salt Creek—	
29° to 29.9°	1.73
30° to 30.9°	1.81
31° to 31.9°	1.89
32° to 32.9°	1.97
33° to 33.9°	2.05
34° to 34.9°	2.13
35° to 35.9°	2.21
36° to 36.9°	2.29
37° and above	2.37
Big Muddy	2.25
Mule Creek	1.75
Grass Creek, light	2.40
Grass Creek, heavy	.90
Elk Basin	2.40
Lance Creek	2.40
Rex Lake	1.45
Osage	2.40
Lost Soldier (Contract)	1.35
Greybull-Torchlight	2.15
Hamilton Dome	1.35
Cat Creek (Mont.)	2.40
Sunburst (Mont.) (Oct. 5)	1.35
Florence (Colo.)	1.60
Artesia	1.95
Hogback (N. Mex.)	2.45

Note: Salt Creek, Osage, Cat Creek, Greybull and Hogback posted by Midwest Refining Co., and the remainder by the

(Continued on Page 356)

TANK WAGON MARKETS

Tankwagon quotations for gasoline and kerosene in United States as furnished by the larger marketing concerns, Oct. 5.

ALL TANKWAGON AND SERVICE STATION QUOTATIONS INCLUDE TAXES

STANDARD OIL CO. (INDIANA)
Main Service Station Price

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
Chicago Dist.—				
†Less than 100 gals.	19.0	21 0	...	15 5

Tankwagon prices on April 19, 1922, g. up 1½c; May 8, up 1c; June 27, g. and k. up 1c; July 19, g. down 2c; k. down 1c; Oct. 10, g. down 2c; Oct. 21, g. down 1c; Feb. 5, 1923, g. up 1c; Feb. 20, g. up 1c; Aug. 14, g. down 6.6c; Oct. 4, k. down 1½c; Nov. 10, g. down 1.4c; Dec. 20, g. up 2c; Jan. 12, 1924, g. up 2c; k. up 1c; Feb. 5, g. up 2c, k. 1c; July 18, g. down 1c; July 30, g. and k. down 1c; Sept. 12, g. down 2c; Jan. 23, 1925, g. up 1c; Jan. 24, g. up 1c; Jan. 31, g. up 1c; Feb. 12, g. up 2c, k. up 1c; April 19, g. down 1c; July 14, g. up 1c; Aug. 25, g. down 2c, k. down 1c; Sept. 1, g. down 1c; Feb. 4, 1926, g. up 1c, k. up 1c; April 16, k. up 1c; April 24, k. up ½c; April 29, g. up 1c, k. up ½c; May 6, k. up ½c; May 17, g. and k. up 1c; July 1, k. down 1c; July 3, k. down 1c; Aug. 13, k. up 1c; Aug. 24, k. up 1c.

Decatur, Ill.	19 2	21 2	...	16 0
E St. Louis	18 1	20.35	...	15 1
Joliet	19 4	21.4	...	16 3
Peoria	19 2	21.2	...	16.0
Quincy	19 2	21 2	...	15 8
Davenport, Ia.	21.5	23 5	2 0	16 4
Des Moines	21 5	23 5	2.0	16 4
Keokuk	21 5	23.5	2 0	16 4
Sioux City	19.9	20 9	2 0	16 0
Duluth, Minn.	22 5	24 5	2 0	17 1
Minneapolis	22 2	24 2	2.0	17 1
La Cross, Wis.	22 2	24.2	2 0	16 9
Milwaukee	21 1	23 1	2 0	15 8
Madison	21.3	23 3	2 0	16 0
Detroit, Mich.	21 8	23 8	2 0	16 7
Grand Rapids	21.7	23 7	2.0	16 6
Saginaw	21 9	23.9	2 0	16 8
Evansville, Ind.	22 0	24 0	3 0	16 0
Ft. Wayne	22.4	24 4	3 0	16 4
Indianapolis	22 2	24 2	3.0	16 2
South Bend	22.4	24 4	3 0	16 4
Fargo, N. D.	23.9	25 9	2 0	19 1
Huron, S. D.	23 5	25 5	3 0	17 6
Sioux Falls	22 0	24 0	3 0	17.1
*K. C., Mo.	21.9	23 9	3 0	14 8
*Springfield	21 8	23 8	3.0	15 7
*St. Louis	20 6	22.9	2 5	15 5
*St. Joseph	21 0	23 0	2.5	15 4
†Wichita, Kan.	19 8	21 8	2 0	15 3
Bartlesville, Ok.	20 8	22.8	3 0	15 3

NAPHTHAS

	Tank wagon	Tank car
Oleum spirits	21.0	15 0
V. M. & P. Naphtha	23 0	16 5
Cleaners naphtha	21 0	17.5

Tankwagon prices f.o.b. Chicago; tank car prices f.o.b. Whiting.

*State tax is 2c. Remainder is city tax.
†Quantity price on more than 100 gallons, 18.0.
‡At all Kansas points a discount of 1 cent a gallon is allowed from the tankwagon postings on dumps of 50 gallons or more.

The following monthly rebate system is effective on tankwagon schedules throughout the territory of Standard Oil Co. of Indiana: Over 750 gallons, ¼c; over 2,000 gallons, ¾c; over 3,000 gallons, 1c; over 6,000 gallons, 1¼c; over 10,000 gallons, 2c. If quantity bought during the year is equal to 12 times the monthly agreed purchases the discount will be paid or credited on the entire quantity less monthly payments. Service station customers will receive discount of 1 cent a gallon on purchases amounting to 200 gallons a month or 2,400 gallons a year; and 2 cents a gallon on 600 gallons a month or 7,200 gallons a year.

STANDARD FURNACE OIL
(Standard Oil Co. of Indiana)

Less than 100 gallons	10 0
100 to 399 gallons	9 5
400 or more gallons	9 0

SOUTHWESTERN DISTRICT
***Magnolia Petroleum Co.**

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
Dallas, Tex.	†17 0	17 0	1 0	15 0
Fort Worth	†17 0	17 0	1 0	15.0
Houston	†21 0	21 0	1.0	15 0
San Antonio	†19 0	19 0	1.0	15 0
El Paso	†21 0	21 0	1 0	16 0
Texarkana	†21.0	21.0	1.0	16.0
Muskogee, Ok.	20 0	23 0	3.0	13 0
Okla. City	18 0	21.0	3 0	15 0
Tulsa	20 0	23.0	3 0	15 0
Little Rock	22 0	25 0	4 0	15 5
Ft. Smith, Ark.	22.0	25 0	4 0	15 5

*The following is the schedule of discounts on quantity gasoline sales adopted by the Magnolia Petroleum Co. in Oklahoma: Over 750 gallons a month, ½c; over 2,000 gallons, ¾c; over 3,000 gallons, 1c; over 4,500 gallons, 1¼c; over 6,000 gallons, 1¾c; over 8,000 gallons, 1¾c; over 10,000 gallons, 2c. If the quantity bought during the year is 12 times the monthly agreed purchases, the discount will be paid or credited on the entire quantity for the year less any monthly purchases.

The schedule on service station deliveries is: Over 200 gallons a month, 1c; over 300 gallons a month, 1¼c; over 400 gallons, 1½c; over 500 gallons a month, 1¾c; over 600 gallons, 2c. The same rule applies for annual purchases as in the tankwagon discounts.

†Magnolia maintains only a retail schedule in Texas with dealers and large consumers allowed a flat 3-cent discount, except at El Paso where the discount is only 2 cents.

CENTRAL SOUTH DISTRICT
Standard Oil Co. (Louisiana)

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
*New Orleans	20 5	23.5	3 0	16 0
Alexanderia	20.0	23 0	2 0	17 0
Baton Rouge	19.0	22 0	2 0	15 5
LaFayette	20 0	23 0	2 0	16 5
Lake Charles	20.5	23 5	2 0	17.5
Shreveport, La.	19 0	22 0	2 0	16 0
Memphis, Tenn.	20 0	23.0	3 0	17 0
Chattanooga	23 5	26.5	3 0	17 5
Knoxville	23 5	26 5	3.0	18 0
Nashville	21.0	24 0	3 0	18 0
Bristol	24 0	27 0	3 0	17 5
Little Rock Ark	22 0	25 0	4 0	16.0

*Tax of 3c includes city tax of 1c.
*Louisiana kerosene prices include 1-cent State tax.

SOUTHERN DISTRICT
Standard Oil Co. (Kentucky)

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
Atlanta, Ga.	25.0	28 0	3 5	19 0
Augusta	25 0	28 0	3 5	19.0
Macon	25 0	28 0	3 5	19 0
Savannah	23 0	25.0	3.5	17 0
Birm'ghm, Ala.	22 0	25 0	2 0	18 5
Mobile	21 0	24 0	2 0	17.0
Montgomery	23.0	26 0	3 0	19 5
Clarksdale, Miss	23 0	26 0	4 0	15 5
Jackson	23 0	26.0	4.0	16 5
Natchez	22 5	25 5	4 0	16 0
Vicksburg	22.5	25 5	4 0	16 0
Jack'ville, Fla.	23 0	26 0	4.0	17 0
Miami	25 0	28 0	4 0	18 5
Pensacola	23.0	26.0	4 0	17 5
Tampa	23 0	26 0	4 0	17 0
Covington	24.0	27 0	5 0	18.0
Louisville	24 0	27 0	5 0	17 0
Lexington, Ky.	25 0	28 0	5 0	18.0

In addition to the state tax of 2c on gasoline, Montgomery has city tax of 1c on gasoline and ½c on kerosene. Prices in Georgia include ½c inspection fee on gasoline and kerosene; in Florida, an inspection fee of 0.125c; in Alabama, an inspection fee of ½c on kerosene only.

OHIO
Standard Oil Co. (Ohio)

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
All Ohio points	22 0	24 0	2 0	17 0

ROCKY MOUNTAIN DISTRICT
Continental Oil Co.

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
Denver, Colo.	22 0	22 0	2 0	18 0
Pueblo	22 0	24 0	2 0	18 0
Grand Jct.	26 0	28 0	2 0	22 0
Casper, Wyo.	22.5	24 5	2 5	16 5
Cheyenne	23 5	25 5	2 5	18.0
Butte, Mont.	24 0	24 0	2.0	20 5
Helena	26 0	28 0	2 0	20.5
Salt Lake, Utah	26 0	28 0	3 5	19.0
Boise, Idaho	27 0	29.0	3 0	21 0
Albuquerque, N. Mex.	28 5	28 5	3 0	20.0

ATLANTIC COAST DISTRICT
Standard Oil Co. (New Jersey)

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
Atlantic City	19 0		...	16 0
Newark, N. J.	19 0	21 0	...	16.0
Annapolis, Md.	21 0	...	2 0	16 0
Baltimore	21 0	24 0	2 0	16.0
Cumberland	21 0	24 0	2 0	16 0
Washington	21 0	24 0	2.0	16 0
Danville, Va.	23 5	...	4 5	16 0
Norfolk	23 5	26 5	4.5	16 0
Petersburg	23 5	26 5	4 5	16 0
Roanoke	23 5	26 5	4.5	16 0
Richmond	23 5	26 5	4 5	16 0
Charleston, W. Va.	21 5	24 5	3 5	16.0
Keyser	22 5	...	3 5	16 0
Parkersburg	21 5	24 5	3 5	16 0
Wheeling	21.5	24 5	3 5	16 0
Charlotte, N. C.	23 5	26 5	4 0	16.0
Hickory	23 5	...	4 0	16.0
Mt. Airy	23 5	26 5	4 0	16 0
Salisbury	23 5	26 5	4 0	16 0
Charleston, S.C.	24 5	27 5	5.0	16.0
Columbia	24 5	27 5	5 0	16.0

NEW YORK AND PART OF NEW ENGLAND DISTRICT

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
Albany, N. Y.	17 0	....	...	18 0
*New York	21 0	....	...	18.0
Buffalo	20 0	....	...	18.0
Rochester	20 0	....	...	16 0
Syracuse	21 0	....	...	18 0
Boston, Mass.	21 0	....	...	18 0
Augusta, Me.	24 0	....	3.0	18 0
Manchester, N. H.	23 0	....	2.0	18.0
Burlington, Vt.	23 0	....	2 0	18.0

*Price in steel barrels.
Note: Standard Oil Co. of New York does not generally quote service station price in its territory. In most cases the service station price is 2 to 3 cents higher than tankwagon price.

NEBRASKA
Standard Oil Co. (Nebraska)

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
Omaha	21 25	23 25	2 0	16 0
McCook	22.75	24 75	2.0	17 5
Norfolk	21 75	23 75	2.0	16 5
N. Platte	22.75	24.75	2 0	17 5
Scottabluff	25 25	24 25	2.0	16.75

PACIFIC COAST DISTRICT
Standard Oil Co. (California)

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
San Francisco	18 0	22 0	2 0	15
Los Angeles	13.5	16.5	2.0	10.5
Fresno	18 5	22 5	2.0	17.5
Reno, Nev.	23 5	27 5	4 0	20
Portland, Ore.	19.0	23 0	3 0	16
Seattle, Wash.	18 0	22 0	3 0	16
Spokane	22 0	26.0	3.0	16
Tacoma	18 0	22 0	2 0	16
Phoenix, Ariz.	25 0	28 0	3 0	21.5

PENNSYLVANIA-DELAWARE AND PART NEW ENGLAND
Atlantic Refining Co.

	Gasoline			Kero.
	Tank wagon	Service station	Incids tax of	Tank wagon
*Pittsburgh, Pa	20.0	25 0	...	17.0
*Philadelphia	20 0	25 0	...	17.0
*Scranton	20.0	25 0	...	17.0
*Allentown	20 0	25 0	...	17 0
Altoona	20 0	25.0	...	17 0
*Erie	18.0	23.0	...	15 0
Dover, Del.	22 0	25 0	2 0	17 0
Wilmington	22 0	25 0	2.0	17 0
Spring'd, Mass.	21 0	23 0	...	18.0
Worcester	21 0	23 0	...	18.0
Boston	21 0	23 0	...	18.0
Providence, R.I.	22 0	24 0	1 0	18 0
Hartford, Conn.	23.0	26.0	2 0	17 0
New Haven	23 0	26.0	2.0	18.0

*Pennsylvania tax of 2c is collected by the dealer and paid by him direct to the State.

CRUDE PRICE CHANGES

September 29—Champlin Refining Co. at Enid reduced its prices for crude bought in the Tonkawa and Garber Fields 10 cents, making its new schedule the same as the prevailing posted prices in the Mid-Continent.

October 4—Kay County Gas Co. followed previous reductions of other buyers and posted a price of $1.25 for all Panhandle, Texas, crude.

October 5—Sunburst, Mont., crude advanced 10 cents.

TANKWAGON PRICE CHANGE

October 5—The Standard Oil Co. of New Jersey reduced the tankwagon price of kerosene 1c throughout its territory.

CALIFORNIA CRUDE PRICES
***Standard Oil Co.-Union Oil Co.**
(Effective March 11)

Gravity—	Long Beach Huntington Beach Richfield Brea-Olinda Rosecrans-Dom'gues Torrance-Inglewood	Whittier La Habra Montebello	Kern River Newhall-McKittrick Midway-Sunset Elk Hills Lost Hills Belridge	Coyote	Santa Fe Springs	Coalinga	Wheeler Ridge	Santa Maria Ventura Salt Lake
14°	.85	.85	.75	.85	.....	.75	.75	.85
15°	.87	.85	.75	.85	.....	.75	.75	.85
16°	.90	.85	.75	.85	.....	.75	.75	.85
17°	.94	.85	.75	.85	.....	.75	.75	.85
18°	.98	.86	.75	.86	.....	.75	.75	.85
19°	1 04	.87	.75	.87	.....	.75	.75	.85
20°	1 10	.89	.82	.90	.89	.79	.78	.90
21°	1 16	.91	.90	.98	.91	.86	.81	.97
22°	1 22	.94	1.00	1 06	.94	.93	.85	1 04
23°	1 28	.97	1 11	1 14	.97	1 00	.89	1 11
24°	1 34	1 01	1 22	1 22	1 02	1 07	.93	1 18
25°	1 40	1.05	1 33	1 30	1 08	1.14	.97	1.25
26°	1 46	1 09	1 44	1.38	1 16	1 21	1 01	1 32
27°	1 52	1 13	1.55	1 46	1.24	1 28	1 05	1 39
28°	1 58	1 17	1 66	1 54	1.32	1 35	....	1 46
29°	1 64	1 21	1 77	1 62	1.40	1 42	....	1.53
30°	1 70	1 25	1 88	1 70	1 48	1 49	....	1.60
31°	1 76	....	1 99	....	1 60	1 56	....	1 67
32°	1.84	....	2.10	....	1 72	1.63	....	1 73
33°	1 92	....	2 21	....	1 84	1.70	....	1 79
34°	2 00	....	2 32	....	1 96	1 77	....	1 85
35°	2 08	....	....	....	2.08	1.84	....	1 92
36°	2 16	....	....	....	2 16	....	....	....
37°	2 24	....	....	....	2 24	....	....	....
38°	2 34	....	....	....	2 34	....	....	....
39°	2 44	....	....	....	2.44	....	....	....
40°	2.54	....	....	....	....	....	....	....
41°	2 64	....	....	....	....	....	....	....
42°	2 74	....	....	....	....	....	....	....

*Column 2—Long Beach and Huntington Beach crudes, 14 to 32 degrees, inclusive; Richfield and Brea-Olinda, 14 to 30 degrees; Torrance and Inglewood, 14 to 28 degrees; Dominguez, 24 to 42 degrees. Rosecrans crude ranges from 14 to 42 degrees, but only Union Oil Co. posts below 24 degrees.
Column 3—Whittier and La Habra crudes, 14 to 22 degrees; Montebello, 14 to 30 degrees.
Column 4—Kern River, Newhall and McKittrick, 14 to 19 degrees; Midway-Sunset and Elk Hills, 14 to 23 degrees; Lost Hills and Belridge, 14 to 34 degrees.
Column 6—Santa Fe Springs. Only Union Oil Co. posts below 24 degrees.
Column 9—Salt Lake, 14 to 19 degrees inclusive; Santa Maria, 14 to 30 degrees; Ventura, 14 to 35 degrees. Posted only by Union Oil Co.

COURSE IN GEOLOGY OFFERED TO OIL MEN

An extension course of the Department of Geology, University of Tulsa, open to all persons interested in geology, will open in Tulsa Friday night, the class meeting each Friday night thereafter in the Y. M. C. A. Building. The course will close next May with a week's trip to the Arbuckle Mountains in Oklahoma, where practical field work will be conducted.

Statement of the Ownership, Management, Etc., of
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W. T. BRYAN,
Treasurer.

Sworn to and subscribed before me this 1st day of October, 1926.

CORA MAE MAXFIELD,
Notary Public.

My commission expires May 15, 1930.

WAR on WASTE!

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for every machine
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MOTOR OIL

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Oil Securities Heavy During Week

Selling Converges on Maracaibo, Galena Signal and New York Transit, Which Record New Lows for the Year

By N. O. Fanning

New York Bureau, The Oil and Gas Journal, Room 543, 30 Church St., New York City

NEW YORK, Oct. 4.—Oil securities were heavy during the past week, the selling converging on Maracaibo oil, Galena Signal and New York Transit, all of which established new lows for the year.

Cash dividend disbursements by the companies of the Standard Oil group this year, the New York Times says, are expected to aggregate $190,000,000 which will represent a new high mark for all time. A total payment of $190,000,000 would represent an increase of about $36,500,000, or 24 per cent, over the $153,506,000 paid out in cash by the group of companies last year. Last year, incidentally, saw the largest dividend distribution up to that time.

Four of the companies, Standard of New Jersey, of Indiana, of New York and of California, will, it is estimated, distribute in the current year approximately $116,000,000 in cash, which would represent slightly more than 60 per cent of the total estimated dividends for the whole group.

Anglo-Persian Oil

The Anglo-Persian Oil Co. will pay off January 1, 1927, the £1,000,000 outstanding of the original £1,816,700 issue of five-year 6½ per cent secured notes dated March 1, 1924.

Barnsdall Corp.

For the nine months ended September 30, 1926, Barnsdall Corp. reports net income after interest, taxes, depreciation and depletion of $4,783,366. This is equivalent to $4.20 per share (par $25) on the 1,137,561 shares of combined A and B stock outstanding, as compared with $2,158,996, or $2.37 a share, on 910,952 shares outstanding for the corresponding period of 1925.

For the seven months ended July 31, 1926, net after interest, taxes, depreciation and depletion previously reported was equivalent to $3.24 a share on the combined A and B stock, against $1.68 a share for the 1925 period.

Plymouth Oil

Directors of the Plymouth Oil Co. rescinded the dividend action of August 25 when they declared a dividend of 50 cents a share and extra of 25 cents, payable September 30 to stockholders of record September 20. The directors of the Big Lake Oil Co. also rescinded dividend action taken on the same date. These actions followed the suit brought by the State of Texas against the companies.

Richfield Oil

Bond & Goodwin & Tucker, Inc., Hemphill, Noyes & Co. and Aronson & Co. on October 1 offered for public subscription $12,000,000 first mortage and collateral trust gold bonds of an authorized issue of $20,000,000. Proceeds are to be used for retirement of funded debt of subsidiary corporations, for the acquisition of properties and for other corporate purposes. The company recently absorbed the McKeon Oil Co. and McKeon Drilling Co. of California, which have settled production of 2,700 bbls. daily from 25 wells in Long Beach, Huntington Beach and Rosecrans for $1,800,000. Other purchases are contemplated.

The bonds are convertible into common stock of the Richfield Oil Co. at the option of the holder, as follows: Each $1,000 par value bonds convertible into (1) 29 shares of stock from September 15, 1927, to September 14, 1928; (2) 25 shares from September 15, 1928, to September 14, 1929; (3) 22 shares from September 15, 1929, to September 14, 1930; (4) 20 shares from September 15, 1930, and thereafter until maturity. The above are equivalent to (1) $34.50 per share; (2) $40 per share; (3) $45.50 per share; (4) $50 per share. The bonds are listed on the Boston Stock Exchange.

The offering price is 99 per cent and accrued interest, to yield about 6.10 per cent.

Net earnings of the Richfield Oil Co. after deduction of Federal taxes, depletion and depreciation, and after interest on the subsidiary company's funded debt, have been as follows:

First 7 months 1926	$2,530,005
Year 1925	1,771,984
Year 1924	1,250,821
Year 1923	718,610
Year 1922	504,779

The above earnings for 1922 to 1925, inclusive, are those of the United Oil Co. alone. Earnings for the first seven months of 1926 include earnings of new acquisitions and are at the rate of six times interest requirements on the bonds. The Richfield company was organized recently to take over all, or substantially all, of the capital stock of the United Oil Co., according to a statement made by J. A. Talbot, president, in connection with the bond issue.

Skelly Oil

The Skelly Oil Co. and subsidiaries report for the seven months ended July 31, 1926, consolidated net income of $3,525,658 after taxes, interest, depreciation, depletion, etc., equivalent to $3.81 a share (par $25) earned on 923,359 outstanding shares of capital stock.

The consolidated income account for the seven months ended July 31, 1926, follows:

Gross earnings	$14,495,204
Expenses, ins., taxes, etc.	7,937,014
Interest	383,282
Profit before resr.	$ 6,174,908
Depr. and depl. reserves	2,596,1
Minority stock prop.	54,1
Net income	$ 3,523,6

Union Tank Car

The Union Tank Car common sto sold at a new high for the year of 129

Blair & Co. and Freeman & Co. offe $13,000,000 equivalent trust 4½ per c certificates of the Union Tank Car C at prices, according to maturity, to yi 4.70 per cent. The company is takin steps to retire its preferred stock and plans to apply the proceeds of the certi cates to such purpose.

Apart from the proposed issue the co pany has no funded debt. Based on t company's balance sheet as of June 3 1926, total net assets, after deductio current liabilities and reserves and afte giving effect to the proposed financing a retirement of the preferred stock, amou to approximately $44,000,000, or near three and one-half times the amount o this issue.

Under the trust agreement, the ne issue will be retired in 10 years at pa Retirement will be at fixed maturities o $1,300,000 at par annually from Octob 1, 1927, to October 1, 1936, inclusiv The company can, if it desires, redeem t issue in whole or in part at par on an interest day by giving 60 days' notice.

Pan American Western

Pan American Western Petroleum C has declared the regular quarterly divi dend of 50 cents on class A and B stock payable October 30 to stockholders o record October 10.

Columbia Gas & Electric

Merger of the Columbia Gas & Electri Co. and the Ohio Fuel Co. has been e fected. The new company, to be known as the Columbia Gas & Electric Corp. will have combined assets of approx mately $500,000,000. Philip G. Gossler New York, who has been president an chairman of the board of the Columbi Gas & Electric Co., will be president o the new corporation, and George Craw ford, Pittsburgh, president of the Ohi Fuel Co., will be chairman of the board.

The merger will make the new com pany the fifth largest public utility i the United States. The incorporation was consummated at Delaware, where th Corporation Trust Co. of America ha placed on file with the Secretary of Stat the certificate of incorporation. The cap italization consists of $100,000,000 o preferred stock, of $100 par and 4,000,000 shares of no par common.

TEAPOT DOME APPEAL TO SUPREME COURT

NEW YORK, Oct. 2.—Regarding th decision of the U. S. Circuit Court in the Teapot Dome case, officials of the Sinclair Consolidated Oil Corp. say it can have little effect on that company. They state the Sinclair Co., is not a principal in the case, and its interest is due merely to its ownership of about 25 per cent of the stock of Mammoth Oil Co., which has the Teapot lease. If the Supreme Court sustains the Circuit Court, any accounting to be made will be by the Mammoth Oil Co., and the position of the Sinclair Co. in this connection would be similar to that of other stockholders, the shares being non-assessable.

Counsel for Mammoth Oil Co., refused comment on the decision of the Eighth Circuit Court of Appeals overruling Judge Kennedy's decision in the Teapot Dome case until they have had opportunity to read the official opinion. It was stated, however, that application would be duly and speedily made to the Supreme Court to review the decision.

NEW YORK STOCK EXCHANGE—LIST OF ACTIVE STOCKS

Stocks—	Par	Clos. Quot. Oct. 4	Clos. Quot. Sept. 27	1926 High	1926 Low	1925 High	1925 Low	1924 High	1924 Low
Amerada Corp.		31¼	31½	32⅝	21¾	..	..	..	..
Atlantic Ref., com.	100	109⅛	110½	125⅝	97	117½	95¼	140½	78½
Barnsdall "A"	25	27	26⅝	33½	23½	33½	18⅝	29½	14
California Pet., com.	25	31⅛	32	38⅛	30⅝	34⅜	23⅝	29	19⅞
Houston Oil	100	57	59¼	72	50¼	85	59	82½	61
Independent Oil & Gas	..	25½	26	34	20¼	41⅝	13½	16¼	5⅜
Indian Refining	10	9	9¼	13⅜	9½	14¼	5½	7	3⅝
Lago Oil & Trans.	..	20⅞	20⅞	24½	19¼	..	..	..	..
Louisiana Oil	10	15½	15½	19⅝	12	23¾	13⅜	..	..
Maracaibo	..	18½	21⅜	28⅞	18⅜	35½	20⅝	37¼	25⅜
Marland	..	54¼	57	63⅝	49¼	60⅛	32⅝	42	29
Mexican Seaboard	..	9⅜	10¼	13¾	6	22½	9	26⅜	14⅛
Mid-Continent Pet.	..	30	30⅝	41	25⅝	38	25⅜	40¼	22⅜
National Supply	50	70½	70¼	71	55½	71	54⅜	72½	54
Oil Well Supply	25	34⅜	*34	36	30	38	33⅜	..	..
Pan. Amer., B	50	65	67¼	73⅜	56⅛	83⅜	59½	65	44½
Pan. Amer., Western B	..	33	35½	46	34	49⅜	37¼	..	..
Phillips Pet.	..	48½	49⅜	52⅜	42½	47⅛	36¼	52¼	28½
Producers & Refiners	50	15¼	16⅛	17½	11	32⅝	12½	32½	29⅜
Pure Oil, com.	..	26½	26⅞	31	25⅜	33⅜	25⅛	30¼	20
Royal Dutch, N. Y., sh.	13.40	49⅜	50	57⅜	49⅜	57⅜	48¼	59½	40⅜
Shell Transport	10	*42	*44	48⅞	42	49	39⅜	42	33
Shell Union, com.	..	28⅛	28⅞	30⅜	24	28⅜	21⅝	22½	15⅜
Simms Pet.	10	17⅜	18½	28⅝	16½	28½	17⅜	24	10⅝
Sinclair Consolidated, com.	..	19⅛	20⅛	24⅞	19⅜	24⅞	17	17½	15
Skelly Oil	25	33⅜	34½	37⅛	27	32½	21⅜	29	17⅛
Standard of California	25	60	60⅜	63½	54	67¼	51⅜	68½	55½
Standard of New Jersey, com.	25	42⅜	42⅝	46⅜	40¼	47⅛	38⅜	41½	33
Sun Oil Co.	..	33½	*34	41⅝	30⅛	43⅜	38⅝	..	..
The Texas Company	25	54¼	55⅞	58	48	55	42⅜	45⅝	37⅜
Texas Pacific Coal & Oil	10	14⅜	15¼	19½	12⅛	23⅝	11	15¼	8¼
Tide Water Oil	25	*30	*31	39¼	30⅛	..	..	..	..
Transcontinental	..	4	4⅝	5½	3	5⅝	2½	6½	3⅜
Union Oil of California	25	53½	56⅛	58⅝	37¼	43⅝	33⅜	30	35½
Union Tank, com.	100	116	116	120⅜	84¼	‡134	118	132⅞	94
White Eagle Oil & Refining	..	25⅝	27	29¾	25⅛	31⅝	25⅝	29⅝	23⅛
Standard Oils									
Anglo-American Oil	£1	18¼	18	19⅜	16½	26⅜	17½	18¾	14⅝
Borne-Scrymser	100	*270	*275	295	226	240	205	164	150
Buckeye Pipe Line	50	46	46¼	59½	47⅝	72	63½	85½	51
Chesebrough Mfg. Co.	25	*72	73½	72⅜	63	74	48¼	62½	29¼
Continental	10	19⅞	19⅞	25⅞	19¼	31¼	21⅞	..	..
Crescent Pipe Line	25	*15⅛	*15½	16	14½	17½	10	20	11⅜
Cumberland Pipe Line	100	*107	*106	137	108	156	128	148	108
Eureka Pipe Line	100	*46	46½	63⅜	47⅜	96	61¼	105	74
Galena Signal, com.	100	10½	16¼	32½	9⅞	68½	23½	69⅜	62½
Humble Oil & Refining Co.	25	*56⅜	57⅞	68⅛	52	99	42½	43⅜	36
Illinois Pipe Line	100	*134½	*134½	144	131	154⅛	124	161	123
Imperial Oil, Ltd.	..	35⅛	36	38⅜	32½	39¼	27¼	119	99
Indiana Pipe Line	50	*60	*69½	68	58	84	87½	100	66
International Pet. Co.	10	32	32¼	35½	25⅜	25⅜	22½	34⅜	16⅞
National Transit Co.	12.50	*13½	13⅝	20⅜	14½	25½	16½	25⅞	20⅝
New York Transit	100	31	*31¾	51½	31	79	50	97	54½
Northern Pipe Line	100	*67	*67½	80½	68	88	67½	107½	72
Ohio Oil Co.	25	57½	58⅝	67⅜	56⅜	75¼	60	79½	53
Penn.-Mex. Fuel	25	17	*18⅛	24¼	15	44	19	35⅝	27
Prairie Oil & Gas	25	50¼	51¼	60¼	48	65½	45⅞	269	193
Prairie Pipe Line	100	124	122⅝	127	122½	129⅜	105	111	100
Solar Refining Co.	100	203	*206	212	184½	259	200	240	170
South Penn Oil	25	37⅜	37½	50	35	‡197	139	176	117
Southwest Pa. Line	100	*51	*50½	56	47½	84	50	89	68
Southern Pipe Line	50	*24½	*24¼	74½	61½	103	63	100	80½
Standard of Indiana	25	62½	62⅝	70½	61⅝	70⅝	69½	69⅝	54¼
Standard of Kansas	25	26½	*20	36½	21	46	30¼	50½	32½
Standard of Kentucky	25	120¼	121½	134⅝	108	137	114⅜	121⅞	101
Standard of Nebraska	25	45⅛	46	†51¼	42	270	231	262	198
Standard of New York	25	31⅝	31⅝	47¼	30⅝	48⅝	40	48	37⅜
Standard of Ohio, com.	100	*295	*296	362	292½	369	338	337½	277
Swan & Finch, com.	25	16¼	*17	21	18	27	12	28	20
Vacuum Oil	25	96	98¼	109⅜	94½	109½	80½	83½	50½
Miscellaneous									
Gulf Oil Corp. of Pa.	25	91⅝	91½	95	82½	98¼	63½	67⅝	56
Tidewater Associated	..	22⅝	23⅛	27	21	..	..	..	..

*Bid, no sales. ‡Old stock. †New stock.

The Oil and Gas Journal's weekly average price of 20 representative petroleum stocks listed on the New York Stock Exchange was as follows:

Oct. 4	57.93	Aug. 30	59.86	July 26	58.44
Sept. 27	58.78	Aug. 23	59.06	July 19	$59.45
Sept. 20	58.46	Aug. 16	59.34	July 12	59.43
Sept. 13	59.06	Aug. 9	59.35	July 2	60.38
Sept. 3	60.16	Aug. 2	59.76	June 28	60.17

September Field Work Slows Down

Fewer Completions Than in August, But Average Initial Production of Oil Wells Is Maintained. New Work Off

There ware 232 fewer wells completed in the period covered by the September monthly report of field operations east of California, than the August report showed, and 372 fewer than the July report set forth, and the total initial production for September fell off 31,849 bbls. from the total for August and was 11,797 bbls. less than the initial production in July.

The average initial production of the oil wells completed in September was 185 bbls.; in August 184 bbls., and in July 181 bbls.

The most prolific field in intial production was the Gulf Coast, which shows a total of 108,926 bbls. The largest number of wells completed in any single district was in the Bradford district in northern Pennsylvania which is credited with 177 completed wells without a dry hole Second in completions is the Archer County Field in north Texas, 106, of which 41 were dry, and then Hutchinson County, in the Texas Panhandle, with a total of 102 completed wells, of which 4 were gas wells, but none was dry.

Compared with a year ago the record of completed wells in September, 1926, was large. In September this year 2,495 wells were completed; in September, 1925, 2,175. The initial production in September, 1926, was 312,235 bbls.; in September last year, 230,590 bbls. The dry holes in September, 1926, numbered 629 and in the same month last year 576. The gas wells in September, 1926, totaled 178 and in September last year the same number.

The average initial production of new oil wells in September, 1926, was 185 bbls., and in the same month in 1925, 162 bbls.

In new work, the number of rigs and wells drilling at the close of September shows a slight falling off from the August record, but there were 206 more rigs up and 867 more wells classified as drilling at the close of last month than at the end of September last year.

SUMMARY OF ALL FIELDS

Summary of Wells Completed

Field—	Comp.	Prod.	Dry	Gas
Eastern	538	2,778	60	76
Central Ohio	43	688	8	23
Lima	48	847	1	0
Michigan	10	158	1	0
Indiana	20	226	9	2
Illinois	47	1,188	13	1
Kentucky	104	1,089	24	3
Tennessee	0	0	0	0
Kansas	125	11,212	48	3
Oklahoma	393	45,734	140	24
North and West Tex.	563	58,959	176	13
Texas Panhandle	115	33,089	3	6
East Central Texas	32	20,127	8	0
Gulf Coast	111	108,926	35	0
Southwest Texas	63	10,196	7	11
Arkansas	73	2,569	16	3
Louisiana	92	4,577	40	10
Wyoming	45	2,610	11	0
Montana	52	6,055	25	3
Colorado	3	600	2	0
New Mexico	11	607	3	0
Total September	2,494	312,235	629	178
Total August	2,726	344,084	714	143
Difference	232	31,849	85	35

SUMMARY OF NEW WORK

Rigs and Wells Drilling

Field—	Rigs	Drg.	Total
Eastern	179	547	726
Central Ohio	20	101	121
Lima	2	53	55
Michigan	0	47	47
Indiana	11	49	60
Illinois	1	49	50
Kentucky	9	191	200
Tennessee	0	10	10
Mississippi	5	10	15
Alabama	0	4	4
Florida	4	9	13
Kansas	62	326	388
Oklahoma	250	1,126	1,376
North and West Texas	144	824	968
Texas Panhandle	129	480	609
East Central Texas	13	55	68
Gulf Coast	55	184	239
Southwest Texas	36	93	129
Arkansas	31	87	118
Louisiana	49	123	172
Wyoming	28	331	359
Montana	16	144	160
Colorado	18	99	115
Utah	6	32	38
New Mexico	10	145	155
Total September	1,076	5,119	6,195
Total August	1,055	5,178	6,233
Difference	21	59	38

OKLAHOMA FIELDS

County—	Comp.	Prod.	Dry	Gas
Osage	55	5,040	18	2
Tulsa	8	200	6	0
Okmulgee	54	2,952	21	7
Seminole	17	11,831	4	0
Okfuskee	11	495	5	1
Hughes	16	4,078	6	1
Muskogee and Wagoner	12	644	8	1
Creek	72	5,114	14	4
Pawne	11	1,037	6	0
Kay	18	5,273	3	1
Garfield	25	3,234	11	0
Payne	9	310	3	0
Lincoln	7	576	4	0
Grady	8	330	1	1
Stephens and Cotton	12	268	5	1
Carter	24	3,260	2	3
Miscellaneous	34	592	23	2
Total September	393	45,734	140	24
Total August	539	75,169	169	45
Difference	146	29,435	29	21

Summary of Rigs and Wells Drilling

County—	Rigs	Drg.	Ttl.
Osage	14	78	92
Tulsa	8	19	27
Okmulgee	18	68	86
Seminole	64	195	259
Okfuskee	8	43	51
Hughes	1	41	42
Muskogee and Wagoner	11	23	34
Creek	39	129	168
Pawnee	7	41	48
Kay	12	91	103
Grant	1	12	13
Payne	5	29	34
Lincoln	1	30	31
Garfield	6	60	66
Noble	1	12	13
Pottawatomie	2	13	15
Grady	13	28	41
Comanche	2	15	17
Stephens and Cotton	7	39	46
Garvin and Pontotoc	2	12	14
Carter	14	62	76
Miscellaneous	14	86	100
Total September	250	1,126	1,376
Total August	231	1,135	1,366
Difference	19	9	10

KANSAS FIELDS

Summary of Wells Completed

County—	Comp.	Prod.	Dry	Gas
Butler	19	2,550	8	0
Chautauqua and Elk	6	1,210	1	0
Cowley	5	270	1	1
Greenwood	63	4,892	17	0
Lyon	5	1,125	3	0
Miscellaneous	27	1,165	18	2
Total September	125	11,212	48	3
Total August	222	11,057	77	9
Difference	97	155	29	6

Summary of Rigs and Wells Drilling

County—	Rigs	Drg.	Ttl.
Butler	10	35	45
Chautauqua and Elk	1	17	18
Cowley	3	38	41
Kingman	0	11	11
Lyon	1	12	13
Marion	1	10	11
Sumner	4	23	27
Greenwood	27	70	97
Miscellaneous	15	110	125
Total September	62	326	388
Total August	76	338	414
Difference	14	12	26

NORTH AND WEST TEXAS

Summary of Wells Completed

North Texas—	Comp.	Prod.	Dry	Gas
Archer	106	10,546	41	0
Brown	85	6,791	20	1
Callahan	17	812	4	0
Clay	3	0	3	0
Coleman	9	0	8	1
Comanche	4	0	4	0
Cooke	11	563	1	0
Eastland	20	57	12	4
Foard	1	0	0	1
Hardeman	1	0	1	0
Hood	1	0	1	0
Jack	6	281	2	0
Jones	1	1,000	0	0
McCullough	1	0	1	0
Montague	53	3,339	6	1
Palo Pinto	6	30	3	1
Shackelford	34	2,990	13	3
Stephens	9	1,248	1	1
Throckmorton	5	176	2	0
Wichita	49	3,820	21	0
Wilbarger	29	2,232	11	0
Wise	2	0	2	0
Young	38	998	9	0
West Texas—				
Brewster	1	0	1	0
Crane	6	807	0	0
Crockett	4	95	2	0
Culberson	1	0	1	0
Ector	1	0	1	0
Howard	2	95	1	0
Midland	1	0	1	0
Mitchell	4	116	1	0
Reagan	11	4,160	0	0
Scurry	1	0	1	0
Upton	36	18,803	1	0
Total Sept.	569	58,959	176	13
Total August	533	31,446	201	6
Difference	36	27,513	25	7

Rigs and Wells Drilling

West Texas—	Rigs	Drg.	S.D.	Ttl.
Crane	2	12	5	19
Crocket	0	10	2	12
Mitchell	5	13	2	20
Reagan	9	40	8	57
Upton	20	36	3	59
Miscellaneous	15	64	27	106
Total West Texas	51	175	47	273
North Texas—				
Archer	9	47	5	61
Brown	7	68	17	92
Callahan	7	17	6	30
Coleman	2	14	13	29
Eastland	4	19	10	33
Jack	0	6	3	9
Montague	3	36	3	42
Shackelford	8	60	9	77
Stephens	11	21	9	41
Throckmorton	3	20	5	28
Wichita	8	59	2	69
Wilbarger	17	53	16	86
Young	7	23	3	33
Miscellaneous	7	41	17	65
Total North Texas	93	484	118	695
Grand total September	144	659	165	968
Grand total August	135	666	203	1,004
Difference	9	7	38	36

TEXAS PANHANDLE

Summary of Wells Completed

County—	Comp.	Prod.	Dry	Gas
Carson	8	530	3	0
Gray	3	457	0	0
Hutchinson	102	32,102	0	4
Wheeler	2	0	0	2
Total Sept.	115	33,089	3	6
Total August	107	67,915	2	2
Difference	8	34,826	1	4

Rigs and Wells Drilling

County—	Rigs	Drg.	S.D.	Ttl.
Carson	7	24	4	35
Gray	16	81	5	102
Hutchinson	89	251	52	392
Wheeler	6	12	4	22
Miscellaneous	11	29	18	58
Grand total September	129	397	83	609
Grand total August	122	392	62	576
Increase	7	5	21	33

SOUTHWEST FIELDS

Summary of Operations

Field—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Luling	1	75	0	0	1	2	3
Mirando	52	10,052	4	11	17	45	65
Somerset	2	15	0	0	0	2	2
Rockdale-							
Minerva	5	54	0	0	3	9	12
Miscellaneous	3	0	3	0	15	32	47
Total Sept.	63	10,196	7	11	36	93	129
Total Aug.	81	12,577	11	5	41	104	145
Difference	18	2,381	4	6	5	11	16

GULF COAST

Summary of Operations

District—	Comp.	Prod.	Dry	Rigs	Drg.	Ttl.
Boling	2	1,200	0	1	3	4
Batson	4	140	2	2	5	7
Blue Ridge	1	350	0	2	4	6
Barber Hill	2	600	0	0	3	3
Big Creek	1	1,600	0	0	2	2
Edgerly (La.)	1	100	0	1	2	3
Goose Creek	9	380	4	3	8	11
Humble	2	310	2	2	6	8
Hull	8	5,410	0	3	16	19
High Island	2	50	1	0	3	3
Jennings (La.)	6	460	3	1	5	6
Lockport (La.)	2	6,500	0	2	7	9
Nash Dome	0	0	0	1	4	5
Orange	8	3,425	3	1	5	6
Orchard Dome	0	0	0	0	1	1
Pierce Junction	4	2,475	0	1	9	10
Spindletop	36	76,120	7	13	33	46
Saratoga	1	0	1	0	1	1
Sour Lake	16	9,606	1	7	9	16
Vinton (La.)	4	200	3	2	7	9
West Columbia	0	0	0	1	2	3
Miscellaneous	8	0	8	12	49	61
Total Sept.	111	108,926	35	55	184	239
Total August	105	93,475	28	73	199	272
Difference	6	15,451	7	18	15	33

EAST CENTRAL TEXAS

Summary of September Operations

County—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Limestone	28	18,927	8	0	12	32	44
Navarro	1	1,200	0	0	0	5	5
Milam	1	0	1	0	0	0	0
Hill	2	0	2	0	0	0	0
Miscellaneous	0	0	0	0	1	15	16
Total Sept.	32	20,127	8	0	13	52	68
Total Aug.	25	22,093	11	0	15	54	69
Difference	7	1,966	3	0	2	1	1

ARKANSAS

Summary of Completions and Operations

County—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Union	50	1,406	9	2	19	55	74
Ouachita	12	842	2	1	6	14	20
Columbia	4	31	1	0	3	0	3
Nevada	4	290	1	0	3	5	8
Bradley	0	0	0	0	0	4	4
Miscellaneous	3	0	3	0	0	9	9
Total Sept.	73	2,569	16	2	31	87	118
Total Aug.	104	4,843	23	7	31	93	124
Difference	31	2,274	7	4	0	6	6

LOUISIANA

Summary of Completions and Operations

Parish—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Bossier	4	10	2	0	2	2	4
Caddo	20	1,427	5	1	13	39	52
Caldwell	3	0	3	0	1	2	3
Claiborne	1	0	1	0	0	2	2
DeSoto	4	0	1	3	2	3	5
Grant	6	50	5	0	6	3	9
Jackson	1	0	1	0	2	3	5
La Salle	32	2,595	9	0	10	23	33
Monroe district	7	0	2	5	6	13	19
Natchitoches	2	0	2	0	0	9	9
Rapides	0	0	0	0	0	2	2
Red River	0	0	0	0	0	1	1
Richland	0	0	0	0	0	3	3
Sabine	0	0	0	0	3	2	5
Webster	5	135	3	1	0	8	8
Winn	3	360	1	0	3	6	9
Miscellaneous	4	0	4	0	1	2	3
Total Sept.	92	4,577	49	10	49	123	172
Total Aug.	110	5,778	38	15	36	126	162
Difference	18	1,201	2	5	13	3	10

WYOMING

Summary of Field Operations

District—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Big Muddy	0	0	0	0	0	4	4
Salt Creek	32	2,408	1	0	16	117	133
Lance Creek	1	0	1	0	0	2	2
Big Horn Basin	2	18	1	0	2	57	59
Lost Soldier and Carbon Co.	1	60	0	0	1	30	31
Rock River district	5	124	4	0	0	8	8
Fremont Co.	2	0	2	0	0	29	29
Osage	0	0	0	0	3	4	6
Natrona Co.	1	0	1	0	1	12	13
Baxter Basin	0	0	0	0	0	7	7
Lincoln & Uintah Cos.	0	0	0	0	4	32	36
Miscellaneous	0	0	0	0	2	29	31
Total Sept.	45	2,610	11	0	28	231	259
Total Aug.	47	5,288	4	1	34	328	362
Difference	2	2,678	7	1	6	3	3

MONTANA

Summary of Field Operations

District—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Kevin Sunburst	48	6,030	24	1	11	69	80
Cat Creek and Miscellaneous	4	25	1	2	5	75	80
Total Sept.	52	6,055	25	3	16	144	160
Total Aug.	48	5,779	12	3	15	143	158
Difference	4	276	13	0	1	1	2

COLORADO

Summary of Field Operations

District—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Total Sept.	3	600	2	0	16	99	115
Total Aug.	7	320	2	1	19	100	119
Difference	4	280	0	1	3	1	4

UTAH

Summary of Field Operations

District—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Total Sept.	0	0	0	0	6	32	38
Total Aug.	0	0	0	0	3	31	34
Difference	0	0	0	0	3	1	4

NEW MEXICO

Summary of Field Operations

District—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Total Sept.	11	607	3	0	10	145	155
Total Aug.	15	900	4	0	8	146	154
Difference	4	293	1	0	2	1	1

ILLINOIS

Summary of Field Operations

District—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Clark	9	149	0	0	0	5	5
Cumberland	2	0	2	0	0	0	0
Crawford	10	42	2	1	0	7	7
Lawrence	3	61	0	0	0	4	4
Wabash	17	906	5	0	0	21	21
Marion	2	5	1	0	0	1	1
Coles	1	0	1	0	0	1	1
Douglas	0	0	0	0	0	1	1
Jasper	2	0	2	0	0	0	0
Fayette	0	0	0	0	1	0	1
Edwards	0	0	0	0	0	1	1
McDonough	0	0	0	0	0	3	3
Madison	0	0	0	0	0	2	2
Macon	0	0	0	0	0	1	1
Morgan	1	25	0	0	0	1	1
Shelby	0	0	0	0	0	1	1
Total Sept.	47	1,188	13	1	1	49	50
Total Aug.	34	605	13	1	7	57	64
Difference	13	583	0	0	6	8	14

INDIANA

Summary of Field Operations

District—	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Wells	0	0	0	0	0	1	1
Blackford	1	0	1	0	0	0	0
Jay	2	10	1	0	0	3	3
Adams	4	70	1	0	5	14	19
Huntington	1	20	0	0	0	1	1

Gibson	2	6	1	1	0	2	2
Pike	4	136	0	0	3	7	10
Sullivan	1	0	0	1	0	4	4
Allen	0	0	0	0	2	2	4
Knox	1	0	1	0	0	2	2
Daviess	3	0	3	0	0	4	4
Vigo	0	0	0	0	0	1	1
Shelby	0	0	0	0	0	2	2
Dubois	0	0	0	0	0	1	1
Warrick	1	0	1	0	0	0	0
Benton	0	0	0	0	0	1	1
Johnson	0	0	0	0	0	1	1
Madison	0	0	0	0	0	1	1
Martin	0	0	0	0	0	1	1
Monroe	0	0	0	0	1	0	1
Morgan	0	0	0	0	0	1	1
Total Sept...	29	226	9	2	11	49	60
Total Aug. .	33	631	6	8	7	48	55
Difference ..	13	405	3	6	4	1	5

LIMA FIELD

Summary of Field Operations

	Comp.	Prod.	Dry	Rigs	Drg.	Ttl.
Wood	10	250	1	0	9	9
Hancock	3	241	0	0	10	10
Allen	2	25	0	0	4	4
Auglaize	1	30	0	0	4	4
Sandusky	5	45	0	0	4	4
Mercer	4	54	0	0	3	3
Van Wert	0	0	0	0	1	1
Seneca	0	0	0	0	1	1
Lucas	3	26	0	0	3	3
Ottawa	4	43	0	0	2	2
Shelby	3	44	0	0	4	4
Hardin	3	55	0	0	2	2
Darke	1	8	0	0	5	5
Paulding	0	0	0	2	0	2
Wyandot	1	25	0	0	0	0
Clark	0	0	0	0	1	1
Lima	48	847	1	2	53	55
Michigan	10	158	1	0	47	47
Total Sept.	58	1,005	2	2	100	102
Total Aug.	49	549	4	15	81	96
Difference	9	456	2	13	19	6

CENTRAL OHIO

Summary of Field Operations

	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Knox	1	0	0	0	2	7	9
Ashland	7	0	0	7	11	14	25
Medina	4	51	0	2	1	10	11
Lorain	2	0	2	0	0	1	1
Wayne	6	0	2	4	0	13	13
Holmes	7	257	1	1	5	19	24
Athens	1	0	2	1	1	12	13
Coshocton	4	373	0	1	1	4	5
Cuyahoga	7	0	1	6	0	14	14
Vinton	2	5	0	1	0	4	4
Jackson	0	0	0	0	0	1	1
Summitt	0	0	0	0	0	1	1
Total Sept...	43	688	8	23	20	101	121
Total Aug...	54	300	16	29	24	97	121
Difference..	11	388	8	6	4	4	0

KENTUCKY-TENNESSEE

Summary of Field Operations

	Comp.	Prod.	Dry	Gas	Rigs	Drg.	Ttl.
Warren	6	13	3	0	2	11	13
Allen	9	5	6	0	0	13	13
Barren	27	299	3	0	0	30	30
Owensboro district	21	221	5	0	2	28	30
Cumberland-Monroe	3	244	1	0	2	16	18
Simpson	1	0	1	0	0	1	1
Casey	0	0	0	0	1	1	2
Christian	0	0	0	0	0	1	1
Clinton	0	0	0	0	0	4	4
Grayson	0	0	0	0	0	3	3
Butler	0	0	0	0	0	1	1
Wayne	4	3	2	0	0	6	6
Lee-Owsley	5	8	3	1	0	7	7
Estill	9	75	1	0	0	8	8
Wolfe	0	0	0	0	0	2	2
Powell	0	0	0	0	0	1	1
Lawrence-Johnson	11	85	0	0	0	12	12
Johnson-Magoffin	4	108	0	0	1	22	23
Floyd-Knott	3	29	0	1	0	6	6
Knox	0	0	0	0	0	4	4
Morgan	0	0	0	0	0	3	3
Elliott	0	0	0	0	1	3	4
Menifee	0	0	0	0	0	2	2
Laurel	0	0	0	0	0	1	1
Jackson	0	0	0	0	0	1	1
Greenup	1	0	0	1	0	0	0
Carter	0	0	0	0	0	3	3
McCreary	0	0	0	0	0	2	2
Kentucky	104	1,089	24	3	9	191	200
Tennessee	0	0	0	0	0	10	10
Mississippi	0	0	0	0	5	10	15
Alabama	0	0	0	0	0	4	4
Florida	0	0	0	0	4	9	13
Total Sept...	104	1,089	24	3	18	224	242
Total Aug. ..	113	2,326	21	2	19	215	234
Difference...	9	1,237	3	1	1	9	8

NORTH AND WEST TEXAS

(Continued from Page 42)

that Cooke County's shallow production reached an average of 471 bbls. for the week, the highest point it has made to date.

Upton County's big gain was due in large measure to the Roxana Petroleum Corp.'s No. 3 Della Bowen which was recorded last week as having started out in fine shape. Its first 24-hour gauge showed 802 bbls.

The Wichita Falls district climbed nearly 1,000 bbls. nearer its old boomtime peak when it registered 100,804 bbls. during the past seven-day period, with the help of Archer County's Turbeville Pool and other new completions. The Sunshine Hill area of Wichita County declined a little, however, and it is doubtful if any further increase can be expected next week. Clark and others' daily average was 1,310 bbls., Stidham & Thrasher's 448 bbls. and Bridwell & Heydrick's 426 bbls. the past week, a total of 2,184 bbls., compared with 2,485 bbls. the preceding week.

The Humble Oil & Refining Co.'s extension well in Brown County, No. 2 Hickman, figured in that county's gain, having produced 737 bbls. the first 24 hours. So did William Lester's No. 5 M. E. Fry, which flowed 502 bbls. the first day, and 488 on the fifth day.

Wilbarger, Young and Shackelford Counties failed to receive any unusual completions and consequently dropped off a little due to natural declines.

North Texas Completions

Archer County

American Refining Co.'s No. 5 Turbeville swabbed 300 bbls. and pumped 160 bbls. at 1,499-1,510 feet. Benton & Langford's No. 1 Robinson was shot with 20 quarts at 639-58 feet, making 5 bbls. L. T. Burns' No. 1 Turbeville produced 35 bbls. at 1,517-23 feet. Cook & Reeder's No. 4 Kunkel, 30 bbls. at 1,164-67 feet. J. S. Cosden and Consolidated Oil Co.'s No. 4 Frank Jehlik was dry and plugged at 1,150 feet. Empire Gas & Fuel Co.'s No. 4 Parkey pumped 16 bbls. of oil and 10 bbls. of salt water in six hours. Empire Gas & Fuel Co. and Moran's No. 2 Parkey-A pumped 30 bbls. at 1,571-73 feet.

Gates and others' No. 13 Thomas was estimated at 80 bbls., at 1,152-73 feet; No. 15 Thomas was estimated good for 65 bbls. at 1,150-71 feet. Golding & Cochran's No. 1 Farmer was dry and abandoned at 1,550 feet; No. 4 Lowe was a duster at 1,211 feet. Golding & Cochran and Philmack Oil Co.'s No. 1 Wilson was also abandoned at 1,620 feet.

Gulf Production Co.'s No. 1 Kell & Kempner-C pumped 92 bbls. at 1,794 feet. Humble Oil & Refining Co.'s No. 17 Hamilton made 50 bbls. at 1,259-64 feet. Kentucky Oil Co. and Empire Gas & Fuel Co.'s No. 1 McCrory-C was dry and abandoned at 1,504 feet, with oil sand at 1,440-53 feet failing to produce. Magnolia Petroleum Co.'s No. 3 Hudson made 20 bbls. at 1,149-66 feet; No. 8 Little was dry and abandoned at 1,548 feet; No. 17 Lowe was a 25-bbl. well at 1,256-70 feet; No. 12 Parrish-B pumped 5 bbls. at 1,534-58 feet.

Marland Oil Co., Bass & Dillard's No. 1 Perkins and others bailed 15 bbls. of oil and 50 bbls. of salt water from sand at 1,763-65 feet after plugging back from 1,766½ to 1,765 feet. Muse & Robinson's No. 1 Turbeville was dry and abandoned at 1,525 feet. John O'Neil's No. 1 Turbeville was also a failure at 1,555 feet. Petroleum Producers Co.'s No. 1 Turbeville, which swabbed at the rate of 50 bbls. an hour from sand at 1,489-1,522 feet and made 435 bbls. in 12 hours, produced 529 bbls. initially through 3-inch tubing. The Plains Production Co.'s No. 1 Turbeville swabbed 850 bbls. in 24 hours from sand at 1,489-92 feet. Roxana Petroleum Corp.'s No. 5 Abercrombie & Taylor made 100 bbls. at 1,336-70 feet. Schermerhorn Oil Co.'s No. 2 Miller was dry and abandoned at 693 feet; No. 2 Prideaux was shot with 20 quarts at 596-606 feet and had another sand at 619-41 feet, initial production being 16 bbls. Shaw & Rathke's No. 4 Rogers made 10 bbls. at 1,267-79 feet. Simms Oil Co. and Burns' No. 4 Turbeville was dry and abandoned at 1,092 feet; No. 1 Turbeville-A had sand at 1,498-1,502 feet, estimated good for 100 bbls. but was coring deeper. Simms Oil Co.'s No. 8 Turbeville-A swabbed 250 bbls. in 24 hours at 1,500-02 feet.

The Texas Company's No. 7 Turbeville-C, which swabbed and flowed 1,000 bbls. at 1,498-1,526 feet, flowed 450 bbls. through 3-inch tubing; No. 8 Turbeville-C, which swabbed 1,020, 1,100 and 1,035 bbls. in three consecutive days last week from sand at 1,494-1,522 feet, flowed 500 bbls. initially through 3-inch tubing; No. 9 Turbeville-C, which swabbed 850 bbls. from sand at 1,491-1,520 feet, flowed 400 bbls. initially through 3-inch tubing.

Brown County

Advance Oil Co.'s No. 1 Whitted was dry and abandoned at 1,585 feet. Amerada Petroleum Corp.'s No. 1 Turner was also a failure at 2,260 feet. Barkley & Conway's No. 5 Allen made 100 bbls. at 1,147-62 feet. Bowers' No. 1 Eads was completed for 100 bbls. at 1,316-24 feet. Bradstreet's No. 1 Stout was shot with 60 quarts at 1,158-98 feet, total depth 1,207 feet, and produced 180 bbls. afterward. Curry & Moore's No. 3 Pickett made 75 bbls. at 1,267-85 feet; No. 4 Woolridge made 260 bbls. after a 40-quart shot at 1,213-42 feet. Dozier & Mulloy's No. 3 Byrd was dry and plugged at 1,360 feet.

Gillespie's No. 5 Newton made 25 bbls. at 1,293-1,305 feet. Gilman & McMurray's No. 6 Thompson was a 50 bbl. well after a 20-quart shot at 1,220-36 feet. Holdeman's No. 1 Keller was dry and abandoned at 1,194 feet. Huber Oil Co.'s No. 1-B Byrd was another duster at 1,400 feet.

Humble Oil & Refining Co.'s No. 2 Hickman flowed 737 bbls. the first 24 hours at 1,190-1,225 feet; No. 4-D E. P. and W. H. Kilgore made 100 bbls. at 1,184-96 feet; No. 11-B J. C. Kilgore made 60 bbls. at 1,172-88 feet. Kone Production Co.'s No. 8 Foster was good for 150 bbls. after a 20-quart shot at 1,190-1,211 feet. William Lester's No. 5 M. E. Fry flowed 502 bbls. the first 24 hours from sand at 1,307-09 feet; No. 1-A Fry was dry and abandoned at 1,711 feet. McLester Oil Co.'s No. 10 W. M. Woolridge made 180 bbls. at 1,246-73 feet; No. 12 made 100 bbls. at 1,221-33 and 1,236-45 feet. Magnolia Petroleum Co.'s No. 1 Fry made 20 bbls. at 1,322-24 feet. Maxwell & Turman's No. 1 Broom was dry and abandoned at 1,515 feet. Midwest Exploration Co.'s No. 12 Suttles made 60 bbls. at 1,144-59 feet, total depth 1,160 feet. Ray Oil Co.'s No. 1 Allcorn was dry and abandoned at 1,375 feet. Sinclair Oil & Gas Co.'s No. 1 Shore was completed for 100 bbls. at 1,207-34 feet. Union Oil Co.'s No. 1 Hickman was dry and abandoned at 1,298 feet. West & H-Y Oil Co.'s No. 16 Newton was shot with 20 quarts at 1,192-1,216 feet and made 60 bbls. Hynes and others' No. 1 Leach was dry and plugged at 1,000 feet.

Callahan County

Brown & Co.'s No. 4 Long made 125 bbls. at 1,401-11 feet. Canyon Oil & Gas Co. abandoned the location for No. 6 Derrington. Moore and others' No. 1 Walker & Caldwell was abandoned as dry at 2,015 feet. Prairie Oil & Gas Co.'s No. 6 Cunningham made 5 bbls. at 1,398-1,404 feet. Reeves & Meredith's No. 1 Hall was another failure at 2,205 feet. T. B. Slick's No. 3 McDonough was shot with 10 quarts at 1,400-14 feet and made 60 bbls.

Clay County

British American Oil Co.'s No. 1 Donley was dry and abandoned at 1,807 feet.

Coleman County

Burke-Greis Oil Co. and Gwinnup abandoned the location for their No. 8 Dibrell. Mid-Kansas Oil & Gas Co.'s No. 1 Dibrell was dry and abandoned at 1,878 feet; No. 2 was also plugged at 1,897 feet. Wilford and others' No. 1 West was also a failure at 1,745 feet.

Comanche County

Texas Pacific Coal & Oil Co.'s No. 1 Kirk, near the north line of the county, had a 10 bbl. show at 2,675-2,715 feet after an 80-quart shot, but was drilling deeper at 2,880 feet.

Cooke County

Cochran and others' No. 1 Mitchell was dry and abandoned at 2,506 feet. Hooser and others' No. 4 Dennis made 15 bbls. at 1,247-86 feet; No. 7 Dennis swabbed 378 bbls. the first 24 hours and 360 bbls. the second day from sand at 1,188-1,276 feet. C. C. Lanier's No. 4 Hyman made 55 bbls. at 1,182-92 feet; No. 5 Hyman pumped 45 bbls. from broken sand at 1,158-1,203 feet and solid sand at 1,210-15 feet, total depth 1,224 feet. Lynch, Stahl & Burress' No. 1 Danglemayer pumped 51 bbls. the first 17½ hours and 48 bbls. the following 24 hours. It had broken sand at 796-802 feet and at 802-06 feet. Sun Oil Co.'s No. 3 Hyman pumped 100 bbls. at 1,170-1,217 feet, total depth 1,219 feet; No. 4 Hyman was estimated good for 60 bbls. at 1,203-67 feet.

Eastland County

Conway Brothers' No. 2 Butler was dry and abandoned at 1,439 feet. Gordon's No. 1 Hughes was also a failure at 1,321 feet. Gulf Production Co.'s No. 1 J. W. Horn-A pumped 3½ bbls. of oil and much water in 12 hours so was abandoned at 1,581 feet. Magnolia Petroleum Co.'s No. 1 Thurman made 8 bbls. at 2,840-48 feet, total depth 2,930 feet. Parsons and others' No. 5 Motes made 2,500,000 feet of gas at 3,013-28 feet, total depth 3,088 feet.

Haskell County

Bridwell & Mayfield's No. 1 Bunkley was dry and abandoned at 2,606 feet.

Jack County

Kelly and others' No. 1 Bailey was dry and abandoned at 1,016 feet.

Montague County

Cato Oil Co.'s No. 1 Rollis and others made 63 bbls. from sand at 868-88 feet with gas at 843-60 feet. Commercial Petroleum Co.'s No. 1 Converns was dry and abandoned at 2,204 feet. F. H. Oil Co.'s No. 1 Salmon-B was estimated at 15 bbls. at 916-26 feet. Humble Oil & Refining Co.'s No. 12 Hines made 90 bbls. from broken sand at 1,990-2,00 feet. McMan Oil & Gas Co.'s No. Howard and others had broken sand at 1,163-73 feet, making 22 bbls. Pure Oil Co.'s No. 3 Maddox-C swabbed 72 bbls. in eight hours but was shut in as a gasser making 5,000,000 feet of gas from sand at 885-910 feet; No. 2 Rowland and others'-B swabbed 225 bbls. and pumped 115 bbls. initially from sand at 1,011-1,110 feet. The Texas Company's No. 16 Gist-A was recompleted as a 60,000,000-foot gasser, 265 pounds rock pressure, after plugging back from 975 feet to sand at 620-805 feet; No. 16 Gist-A made 70 bbls. at 881-97 feet, total depth 898 feet. Texhoma Oil & Refining Co.'s No. 14 Howard was a location abandoned; No. 1 Rowland-B swabbed 20 bbls. and pumped 142 bbls. at 1,02-1,101 feet.

M'Culloch County

Van Bibber and others' No. 1 Roberts was shot with 10 quarts at 925-60 feet but was abandoned at 1,110 feet.

Shackelford County

Cranfill & Reynolds' No. 1 Ivey was dry and plugged at 1,322 feet. Dingee and others' No. 1 Diller Brothers was also a failure at 1,505 feet. Hodges & Engle's No. 4 Matthews made 10 bbls. at 952-62 feet. Hope Petroleum Co. abandoned the location for No. 12 Reynolds. Humble Oil & Refining Co.'s No. 10 Cook made 65 bbls. at 1,342-49 feet; No. 11 Cook made 25 bbls. at 1,357-66 feet. Melton Oil Co.'s No. 1 Cannon was estimated good for 1,000,000 feet of gas at 1,988-95 and 1,966-2,012 feet and was still drilling.

Roeser & Pendleton and Marland Oil Co.'s No. 15 Cook A-84 was estimated at 65-bbl. well at 1,324-36 feet; No. A-24 Cook A-84, made 80 bbls. at 1,312-25 feet; No. 29 Cook A-84 made 100 bbls. at 1,121-49 feet; No. 1 Cook A-116 had a gas sand at 1,575-95 feet but a hole full of water at 1,610 feet. It was not completed.

Roeser & Pendleton's No. 3 Cook B-60 made 215 bbls. at 1,269-73 feet; No. 6 Cook B-60 was estimated at 100 bbls. at 1,293-1,310 feet; No. 3 Cook B-61 was estimated at 75 bbls. at 1,304-12 feet; No. 4 Cook B-61 pumped 153 bbls. initially at 1,314-42 feet; No. 18 Cook B-85 was estimated at 65 bbls. at 1,206-26 feet. Waterbury and others' No. 1 Poindexter was dry and abandoned at 1,500 feet. Tannehill Oil Co.'s No. 1 Myer, Section 59, Block 10, E. T. R. R. Survey, topped sand at 1,127 feet, spraying 4 bbls. an hour.

Stephens County

Phillips Petroleum Co.'s No. 1 Moon was completed for 500,000 feet of gas and 10 bbls. of oil following a 30-quart shot at 3,918-85 feet. Texas Fidelity Oil Corp.'s No. 1 Pratt was completed for 240 bbls. of oil and 20,000,000 feet of gas from sand at 1,906-2,005 feet, total depth 2,006 feet.

Throckmorton County

Cranfill & Reynold's No. 1 Lee had

gas sand at 1,303-18 feet, estimated worth 7,000,000 feet, and will probably be shut in. Associated Petroleum Co.'s No. 1 Buchanan was shut down with 4,000,000 feet of gas at 685-91 feet. Humble Oil & Refining Co.'s No. 1 Batchler was dry and abandoned at 1,340 feet; No. 1 Overcash was making 8,000,000 feet of gas at 803-10 feet.

Wichita County

Bridwell & Heydrick's No. 8 Ward & Todd was flowing 470 bbls. from sand at 1,881-90 feet. Hammond and others' No. 1 Brockeridge was dry and abandoned at 2,003 feet. The Texas Company's No. 307 Waggoner, total depth 1,983 feet, was plugged back a foot and produced 30 bbls. of oil and 113 bbls. of water from sand at 1,979-81½ feet. Texhoma Oil & Refining Co.'s No. 1 Weidener was estimated good for 22 bbls. at 246½-48 feet; No. 2 Weidener was estimated at 2 or 3 bb's. at 243-45 feet. Same company's No. 1 Burnett-O pumped 100 bbls. with no water at 1,556-58 and 1,569-80 feet; No. 1 Burnside made 3½ bbls. of oil and 2 bbls. of water at 490-93 feet. Simms Oil Co.'s No. 1 Chilson pumped 111 bbls. at 1,150-54 and 1,168-82 feet; No. 2 Chilson pumped 112 bbls. at 1,166-79 feet.

Wilbarger County

Humble Oil & Refining Co.'s No. 7 Waggoner-G was estimated good for 20 bbls. at 1,886-98 feet, total depth 1,899 feet; No. 7 Waggoner-M swabbed 100 bbls. in 12 hours at 2,322-40 feet, but was preparing to deepen; No. 11 Waggoner-M was completed, estimated 75 bbls. at 2-352-74 feet; No. 15 Waggoner-M also completed for 10 bbls. in sand and lime at 2,339-45 feet; No. 16 made 40 bbls. at 1,900-04 feet; No. 17 estimated 40 bbls. at 1,867-83 feet; No. 12 Waggoner-O pumped 18 bbls. in 12 hours at 1,917-35 feet; No. 2 Waggoner-P, total depth 2,462 feet, plugged back to 2,400 feet, estimated 27 bbls. from lime at 2,352-94 feet. Milham Corp.'s No. 8 Waggoner-H estimated 16 bbls. at 2,369-83 feet; No. 3 Waggoner-L swabbed 90 bbls. at 1,888-1,905 feet. Phillips Petroleum Co.'s No. 1 Waggoner-C pumped 110 bbls. at 2,345-49 and 2,351-60 feet; No. 7 Waggoner-H pumped 175 bb's. at 2,396-2,416 feet and will be deepened; No. 2 Waggoner-R swabbed 80 bbls. at 2,329-41 feet.

Young County

Barnes and others' No. 4 Brown made 12 bbls. at 553-75 feet. Bridwell & Mayfield's No. 4 Williams made 5 bbls. at 629-32 feet; No. 5 was junked at 150 feet; No. 6 made 10 bbls. at 663-74 feet. J. W. Collier's No. 5 fee produced 25 bbls. at 543-46 feet. Evans and others' No. 4 Logan was dry at 600 feet and plugged. Godley Oil Co.'s No. 1 Jones was dry and abandoned at 894 feet. Madden & Hunt's No. 7 Benson made 140 bbls. at 865-98 feet. Murchison & Fain's No. 1 Campbell-G was a duster at 1,001 feet. Panhandle Oil & Refining Co.'s No. 2 Prideaux was also a failure at 910 feet. So was The Texas Company's No. 1 Matthews at 800 feet and the Wentz Oil Corp.'s No. 1 Manley at 2,503 feet.

WEST TEXAS COMPLETIONS

Crane County

Magnolia Petroleum Co.'s No. 2 University was shot with 120 quarts at 2,990-3,038 feet and was swabbing 185 bbls. afterward. This is in the SE cor. Section 34, Block 30, University. Marland Oil Co.'s No. 1-D Hughes, SW cor. Section 88, flowed 1,304 bbls. initially from pay at 2,320-40 feet.

Crockett County

J. D. Young and others' No. 1 R. Massie, C SW, Section 31, Block UV, G. C. & S. F. Survey, was dry and abandoned at 2,200 feet.

Reagan County

Marland Oil Co. abandoned the location for its No. 1 University, SE SW, Section 19, Block 58, University Lands.

Upton County

Dixie Oil Co.'s No. 5 E. S. Hughes, in the William Teer Survey, flowed 1,152 bbls. of pipeline oil initially from pay at 2,072-2,154 feet. Humble Oil & Refining Co.'s No. 3 Burleson, in T. C. Jones Survey No. 100, was swabbing 130 bbls. at 2,167-85 feet; No. 1 J. T. McElroy, SW cor., Section 20, Block 42, T. & P. Survey, T-2-S, was waiting on orders to plug and abandon at 3,515 feet.

Marland Oil Co.'s No. 15 Sanger was shot with 170 quarts at 2,200-45 feet, and swabbed 175 bbls. afterward. It had swabbed 70 bbls. prior to the shot from pay at 2,215-50 feet. Same company's No. 3-A Burleson, on the south edge of the pool, was shot with 60 quarts at 2,141-58 feet and was being put on the pump; No. 23 Burleson, an inside well, was swabbing 250 bbls. at 2,120-50 feet.

Roxana Petroleum Corp.'s No. 1 Hughes was deepened 13 feet to total depth of 2,178 feet with no increase in production. It was completed a couple of weeks ago for 237 bbls. at 2,161-65 feet; No. 3 Bowen, on the southeastern corner of the Burleson Pool, flowed 802 bbls. initially at 2,075-77 feet. The Texas Company's No. 1 Burleson, on the north edge of the pool, swabbed 140 bb's. at 2,154-89 feet and then was shot with 60 quarts from 2,157-87 feet. It was being cleaned out. Texas Pacific Coal & Oil Co.'s No. 2 Milton Sherk had 1,800 feet of oil in the hole at 2,135-2,202 feet, and was preparing to pump.

WEST TEXAS WILDCATS

Andrews County

Amon G. Carter and Henry Zweifel's No. 1 Cowden, moving in material.

Brewster County

J. Rosenborough & Skinner's No. 1 Skinner, total depth 1,290 feet and shut down.

Coke County

Lipan Oil Co.'s No. 1 E. C. Rawlings, drilled by tools 2,700 feet.

Concho County

The Exploration Co.'s No. 1 Hartgrove, drilling 800 feet. Kemper Kimberlin and others' No. 1 Schultz, shut down at 1,572 feet. Culbertson Brothers' No. 1 W. S. See, drilling 925 feet. Gene Mays and others' No. 1 Hartgrove, drilling 922 feet.

Crane County

Cranfill Bros.'s No. 1 P. J. Lea, drilling 3,510 feet. Duffy Brothers and others' No. 1 Cowden Brothers, drilling 555 feet. W. H. Dunning's No. 1 Crier-McElroy, drilling 2,550 feet. Gulf Production Co.'s No. 1 State Lasseter, spudding; No. 1 Crier-McElroy, shut down for storage; No. 2, shut down temporarily; No. 3, shut down temporarily; No. 2 T. J. McIlroy, fishing two strings of tools at 2,165 feet; No. 3, shut down for storage. Independent Oil & Gas Co.'s No. 1 E. S. Hughes, top salt 653 feet and shut down for orders at 2,264 feet; No. 3 Taylor, top salt 443 feet and drilling 815 feet; No. 5, top salt 442 feet and drilling 1,580 feet; No. 7, shut down at 2,575 feet for orders; No. 8, shut down 2,355 feet for orders; No. 9, top salt 425 feet and drilling 880 feet; No. 10, rigging up. Magnolia Petroleum Co.'s No. 2 Church (University), shot 120 quarts at 2,990-3,038 feet and swabbed 185 bbls.; No. 2 O'Keefe (University), drilling 550 feet. Marland Oil Co.'s No. 2 Hughes-Gibbs, building rig; No. 1 Mary Dawson, drilling 340 feet; No. 2 C E. S. Hughes, fishing for tools at 2,301 feet and 1,500 feet oil in hole; No. 3-C, drilling 1,900 feet; No. 4 C, building rig. Prairie Oil & Gas Co.'s No. 1 University, rigging up; No. 2, moving in tools. Ben D. Simon and others' No. 1 Brookfield Investment Co., moving in tools. The Texas Company's No. 6 H. M. King, pay 2,301-52 feet, 2,355 feet shot 60, cleaning out; No. 7, drilling 2,290 feet; No. 10, digging cellar. Texas Development Co.'s No. 1 Cowden, shut down at 3,820 feet.

Crockett County

Anchor Oil Co.'s (Cumberland), No. 1 Couch, shut down at 1,835 feet. Gulf Production Co.'s No. 1-D L. P. Powell, drilling 1,350 feet. Humble Oil & Refining Co.'s No. 1-B Powell, shut down at 275 feet. J. K. Hughes' No. 2-A Powell, drilling 820 feet; No. 3 A, drilling 2,125 feet; No. 2-B, drilling 1,600 feet. Magnolia Petroleum Co.'s No. 2 Shannon, moving in material. Republic Production Co.'s No. 1 L. P. Powell, drilling 2,300 feet. William Schaffer and others' No. 1 University, shut down at 2,191 feet. Ben Simon and others' No. 1 Shannon, shut down at 2,610 feet. J. D. Young & Cromwell's No. 1 Shannon, fishing 500 feet. H. F. Wilcox Oil & Gas Co.'s No. 1 University, drilling 4,270 feet. F. P. Zoch and others' No. 1 University, shut down at 2,005 feet.

Culberson County

James H. Gardner and others' No. 1 Radford, rig on ground. Plymouth Oil Co.'s (Big Lake) No. 1 Derrick, shut down at 350 feet for casing. Pure Oil Co.'s No. 1 Kloh & Rumsey, rigging up.

Ector County

J. S. Cosden and others' No. 1-A G. W. Connell, shut down 3,425 feet for control head with a show of oil at 3,435 feet. No. 1-B W. E. Connell, shut down at 3,770 feet. The Exploration Co.'s No. 1 Kloh & Rumsey, shut down at 3,665 feet, installing steam engine; No. 1 J. D. Slator, rigging up. Llano Oil Co.'s No. 1 E. P. Cowden, drilling 2,910 feet. Sid Richardson's (Taliaferro) No. 1 Henderson, top salt 1,665 feet, drilling 2,325 feet. Simms Oil Co.'s No. 1 W. P. Edwards, drilling 3,419 feet. F. E. Skinner & Eastland's No. 1 J. W. Buchanan, shut down for orders at 3,523 feet.

Fisher County

Ideal Oil Co.'s No. 1 W. F. Martin, cleaning out 3,390 feet bailed 4 gallons live oil. R. W. Raney's No. 1 Maberry, shut down 1,502 feet, contract completed.

Gaines County

Hucony Oil Co.'s No. 1 Lindsey, shut down at 3,255 feet, contract complete.

Garza County

Deep Rock Oil Co.'s No. 1 S. M. Swenson, drilling to 3,340 feet.

Glasscock County

Mascho & Marland Oil Co.'s No. 1 Calder, running 8-inch at 2,075 feet. Plateau Oil Co.'s No. 1 L. S. Bell, drilling 580 feet.

Howard County

Humble Oil & Refining Co.'s No. 1 Douthitt, rigging up. Lockhart & Co.'s No. 1 Roberts, underreaming 10-inch at 650 feet; No. 1 Hyman (Scott), fishing at 1,790 feet; No. 1-A Otis Chalk, drilling at 1,050 feet. Magnolia Petroleum Co.'s No. 1 Mary Chalk, drilling at 950 feet; No. 3 Otis Chalk, drilling at 920 feet; No. 3 A, standardizing at 1,582 feet. Marland Oil Co.'s No. 3 Otis Chalk, drilling at 1,000 feet; No. 4, rigging up. Reeves, Apperman and others' No. 1 H. R. Clay, drilling at 909 feet.

Irion County

Fayette & Tankersly's No. 1 Edwards, shut down at 3,255 feet.

Jeff Davis County

Herbert Oil Co.'s No. 1 T. M. Wingo, shut down at 3,012 feet. Humble Oil & Refining Co.'s No. 1 W. W. McCutcheon, straightreaming at 3,115 feet. J. K. Hughes Development Co.'s No. 1 J. Z. Means, fishing at 550 feet.

Jones County

Gibson & Johnson's No 1 Mrs. J. V. Wright, spudded and shut down. Gillette & Hickey's No. 1 King, drilling at 1,450 feet. Hurley Oil Co. and G. & J.'s No. 1 Sears, rigging up. Marland Oil Co.'s No. 1 S. R. Cox, underreaming at 1,872 feet; No. 1 Mason, rigging up. Midwest Exploration Co.'s No. 1 Thornton, rigging up. Phillips Petroleum Co.'s No 1 Walling, rig up and shut down. Shaw & Rathke and others' No. 1 Bristow, shut down at 500 feet. Leigh Taliaferro's No. 1 King, drilling at 1,315 feet.

Kent County

The Texas Company's No. 1 Barron, straightlining hole at 4,354 feet.

Kimble County

Dixie Oil Co.'s No. 1 Harrison, drilling at 750 feet.

Loving County

Lockhart & Co.'s No. 1 E. L. Allen, drilling at 2,806 feet.

Lynn County

The Hart Oil Corp.'s No 1 C. O. Edwards, shut down at 1,400 feet.

Menard County

J. R. Lewis and others' No. 1 White, shut down at 180 feet.

Mitchell County

Teas & Stivers' No. 1 Pardee, fishing for casing at 485 feet. B. H. Cogdell's No. 1-C F. E. McKenzie, shut down at 125 feet. Owen & Sloan's No 1 C. P. Conoway, drilling at 2,790 feet. Magnolia Petroleum Co.'s No. 2 Foster, fishing at 1,510 feet; No. 1 G. W. Womack, shut down at 2,953 feet. F. P. Zoch and others' No. 1 J. J. Ford, drilling at 1,850 feet.

Nolan County

Hucony Gas Co.'s No. 1 Arthur Sears, drilling at 2,471 feet.

Pecos County

Benedum & Trees' No. 1 J. C. Trees, straightreaming 450 feet. Buell and others' No. 1 Hagan, fishing at 575 feet. Dixie Oil Co.'s No. 1 Hershenson, drilling at 5,309 feet. Kemper Kimberlin's No. 1 Blackman, shut down at 100 feet. Mid-Kansas Oil & Gas and Transcontinental Oil Co.'s No. 1 Yates, rig. Transcontinental Oil Co.'s No. 1 Perry, straightening hole at 3,535 feet. Southern Development Co.'s No. 1 R. G. Heimer, temporarily abandoned. Quinby Oil Co.'s No. 1 Townsite, running 6-inch at 3,280 feet, show of gas at 3,260 feet: No. 2 Bennett, temporarily abandoned at 1,160 feet.

Presidio County

Headlock & Miller's No. 1 Tootle estate, shut down at 2,340 feet.

Reagan County

H. D. Camp and others' No. 1 University, shut down at 2,786 feet. Marland Oil & Texon Oil & Land Co.'s No. 1 Sawyer, fishing at 2,375 feet for tools. Moody Oil Corp.'s No. 1 Sawyer, drilling at 600 feet. Roxana Petroleum Corp.'s No. 1 Boyd, drilling at 1,165 feet, top salt at 1,155 feet. Ben Simon and others' No. 1 R. A. Walters, shut down for orders at 3,110 feet.

Reeves County

Schooler, Slack and others' No. 1 Abram, drilling at 2,800 feet. Grisham & Hunter's No. 1 State Land, fishing at 825 feet. World Oil Co.'s No. 1 Biggs, spudding at 100 feet.

Runnels County

Red Bank Oil Co.'s No. 1 Fowler, drilling at 800 feet. F. P. Zoch and others' No. 1 Bruce, drilling at 855 feet.

Schleicher County

Beavers & Leath and others' No. 1 J. A. and W. T. Whitten, spudded and shut down. Cope & Dalton's No. 1 Sol Meyer, shut down for 8-inch casing at 1,925 feet. S. G. Magee's No. 1 Robinson, rig.

Scurry County

Northwest Exploration Co.'s No. 1 T. C. Stinson, shut down at 126 feet.

Sterling County

The California Co.'s No. 1 Davis, rig on ground. Co-Operative Lease & Development Co.'s No. 1-A E. W. Douthett, shut down at 3,135 feet. The Exploration Co.'s No. 1 C. A. Broome, shut down ordered at 2,700 feet.

Stonewall County

Arkansas Gas & Fuel Co.'s No. 1 Craft, drilling at 4,300 feet. Ward Syndicate's No. 1 J. A. Ward, shut down at 3,828 feet.

Terrell County

Sun Oil Co.'s No. 1 Scott, setting 12-inch at 920 feet. E. T. Williams and others' No. 1 Robertson, drilling at 2,320 feet.

Terry County

Kingsland Oil & Potash Co.'s No. 1 Brownsfield, rig.

Tom Green County

M. D. Bryant and others' No. 1 Llano County School Land, trying to run 6⅝-inch at 2,980 feet. Texon Oil & Land and Marland Oil Co.'s No. 2 Sorrell, drilling at 510 feet. World Oil Co.'s No. 1 Pulliam, drilling at 3,335 feet.

Upton County

Amerada Petroleum Corp.'s No. 1 Hughes, spudding 200 feet. Dixie Oil Co.'s No. 9 Burleson, building rig; No. 10, building rig; No. 8, shut down at 2,270 feet flowing 1,000 bbls. sulphur water, will make deep test; No. 6 Hughes, top salt 500 feet, top pay 2,040 feet, drilling 2,095 feet, 400 feet oil in hole. Hults and others' No. 1 Giddings, building rig. Humble Oil & Refining Co.'s No. 3 A. S. Burleson, pay at 2,167-85 feet, swab 130 bbls.; No 4, drilling at 2,100 feet; No. 5, building rig; No. 1 McElroy, to plug at 3,515 feet. Independent Oil & Gas Co.'s No. 3 A. S. Burleson, shut down for orders, 300 feet oil in hole at 2,200-15 feet; No. 4, drilling at 300 feet; No. 5, building rig;

No. 3 Emma Wooley, shut down for orders at 2,010 feet; No. 4, shut down for orders at 1,955 feet; No. 5, rig; No. 8, building rig. Kirkwood and others' No. 1 Rankin, total depth, 3,950 feet, plugging back to shoot. McMan Oil & Gas Co.'s No. 2 M. L. Baker, rig. Marland Oil Co.'s No. 23 Burleson, swabbing 250 bbls. at 2,120-50 feet; No. 25, drilling at 2,090 feet; No. 26, drilling at 2,050 feet; No. 27, drilling at 1,530 feet; No. 28, drilling at 2,180 feet; No. 29, drilling at 2,110 feet; No. 30, drilling at 1,970 feet; No. 31, drilling at 385 feet; No. 32, rig; No. 33, drilling at 1,950 feet; No. 34, drilling at 300 feet. No. 11 Estep, drilling at 280 feet; No. 2, drilling at 380 feet; No. 3, drilling at 435 feet; No. 4, drilling at 390 feet; No. 5, drilling at 220 feet; No. 6, building; No. 7, building; No. 8, building; No. 1 Shirley, building rig; No. 1 Gibbs, drilling at 2,320 feet. Marland Oil and Texon Oil & Land Co.'s No. 1 Halff, drilling at 1,385 feet. Roxana Petroleum Corp.'s No. 2 Hughes, building rig; No. 2 Estep, rigging up; No. 3, cellar. Sartain & Davis' No. 1 Bull, shut down at 1,660 feet. Skelly Oil Co.'s No. 1 Jones, drilling at 2,945 feet. The Texas Company's No. 8 R. King, drilling at 1,970 feet; No. 9, drilling at 2,034 feet, top pay 2,010 feet, 500 feet oil in hole; No. 3 Burleson, top salt 572 feet, drilling at 1,200 feet; No. 4, drilling at 1,890 feet. Texas Pacific Coal & Oil Co.'s No. 3 Shirk, rig; No. 4 Shirk, spudding at 160 feet.

Val Verde County

A. Blume's No. 1 Moore, drilling at 2,600 feet. East Del Rio Oil Co.'s No. 1 Russell, shut down at 2,954 feet. Hiawatha Oil Co.'s No. 1 Sellers, rigging up. Independent Operators' No. 1 Whitehead, shut down at 3,712 feet. Plateau Oil Co.'s No. 1 Harrison, shut down casing at 3,156 feet. Transcontinental Oil Co.'s No. 1 W. S. Stevenson, drilling at 1,270 feet. Williams' No. 1 Holman, spudding at 100 feet.

Winkler County

Brandon & McCamey's No. 1 Kloh & Ramsey, shut down at 3,350 feet for repairs. L. D. Ladd, Hill and others' No. 1 Amburgey, fishing for tools at 632 feet. R. S. Matthews' No. 1 Cowden, shut down for 20-inch at 20 feet. Sid Richardson's (Taliaferro), No. 1 Sealy, drilling at 2,625 feet. Westbrook and others' No. 1 Hendricks, fishing at 2,720 feet for tools. F. P. Zoch and others' No. 1 John Sealy, shut down at 200 feet.

PRODUCTION BY FIELDS FOR WEEK ENDING SEPTEMBER 27, 1926

Electra

Atlantic Oil Prod. Co.	54
Empire Gas & Fuel Co.	710
Gulf Prod. Co.	870
Humble Oil & Ref. Co.	160
Magnolia Pet. Co.	3,409
Panhandle Ref. Co.	45
Phillips Petroleum Co.	14
Prairie Oil & Gas Co.	90
Rio Bravo Oil Co.	535
The Texas Company	3,504
Texhoma Oil Ref. Co.	1,223
Miscellaneous	8,665
Total	19,279

Burkburnett

Gulf Prod. Co.	440
Humble Oil & Ref. Co.	415
Magnolia Pet. Co.	2,474
Panhandle Ref. Co.	210
Prairie Oil & Gas Co.	20
Simms Oil Co.	17
Sinclair Oil & Gas Co.	50
Skelly Oil Co.	145
The Sun Oil Co.	51
The Texas Company	358
Texhoma Oil & Ref. Co.	514
Miscellaneous	7,001
Total	11,695

Iowa Park

Atlantic Oil Prod. Co.	53
Gulf Prod. Co.	197
Humble Oil & Ref. Co.	150
Magnolia Pet. Co.	300
Panhandle Ref. Co.	98
Roxana Petroleum Corp.	7
Simms Oil Co.	114
The Texas Company	178
Texhoma Oil & Ref. Co.	488
Miscellaneous	2,705
Total	4,290

Wilbarger

Atlantic Oil Prod. Co.	51
Empire Gas & Fuel Co.	859
Gulf Prod. Co.	54
Humble Oil & Refg. Co.	3,078
Phillips Pet. Co.	5,860
Prairie Oil & Gas Co.	105
Roxana Pet. Corp.	365
The Texas Company	24
Texhoma Oil & Refg. Co.	81
Miscellaneous	4,000
Total	14,477

Archer

Atlantic Oil Prod. Co.	190
Barnsdall Oil Co.	925
Cosden Co.	370
Empire Gas & Fuel Co.	529
Gulf Prod. Co.	2,187
Humble Oil & Refg. Co.	1,050
Independent Oil & Gas Co.	5
Magnolia Pet. Co.	1,569
Marland Oil Co.	852
Panhandle Refg. Co.	125
Phillips Pet. Co.	569
Prairie Oil & Gas Co.	1,802
Roxana Pet. Corp.	407
Simms Oil Co.	1,230
Sun Oil Co.	247
The Texas Company	2,846
Texhoma Oil & Refg. Co.	2,727
Tidal Oil Co.	35
Miscellaneous	11,250
Total	30,915

Young

Atlantic Oil Prod. Co.	664
J. S. Cosden	211
Gulf Prod. Co.	185
Humble Oil & Refg. Co.	270
Magnolia Pet. Co.	130
Marland Oil Co.	2
Panhandle Refg. Co.	135
Phillips Pet. Co.	20
Prairie Oil & Gas Co.	10
Roxana Pet. Corp.	135
Simms Oil Co.	556
Sinclair Oil & Gas Co.	353
Sun Oil Co.	211
The Texas Company	308
Texhoma Oil & Refg. Co.	298
Tidal Oil Co.	160
Miscellaneous	4,700
Total	8,348

Stephens

Arkansas Fuel Oil Co.	25
Empire Gas & Fuel Co.	25
Gulf Prod. Co.	1,070
Humble Oil & Refg. Co.	600
Magnolia Pet. Co.	230
Mid-Kansas Oil & Gas Co.	1,440
Phillips Pet. Co.	370
Prairie Oil & Gas Co.	740
Republic Prod. Co.	130
Roxana Pet. Corp.	45
Simms Oil Co.	25
Sinclair Oil & Gas Co.	75
Sun Oil Co.	165
The Texas Company	920
Texas Pacific Coal & Oil Co.	1,070
Miscellaneous	4,122
Total	11,152

Shackelford

Amerada Pet. Corp.	3
Empire Gas & Fuel Co.	20
Humble Oil & Refg. Co.	1,005
Independent Oil & Gas Co.	6
Magnolia Pet. Co.	50
Phillips Pet. Co.	570
Prairie Oil & Gas Co.	10
The Texas Company	170
Texhoma Oil & Refg. Co.	65
Miscellaneous	8,410
Total	10,309

Ranger

Arkansas Fuel Oil Co.	5
Gulf Prod. Co.	513
Humble Oil & Refg. Co.	40
Magnolia Pet. Co.	535
Mid-Kansas Oil & Gas Co.	100
Panhandle Refg. Co.	110
Phillips Pet. Co.	18
Prairie Oil & Gas Co.	540
Republic Prod. Co.	40
Simms Oil Co.	20
Sinclair Oil & Gas Co.	275
The Texas Company	145
Texas Pacific Coal & Oil Co.	775
Transcontinental Oil Co.	30
Miscellaneous	2,365
Total	5,511

Eastland-Comanche

Empire Gas & Fuel Co.	5
Humble Oil & Refg. Co.	90
Magnolia Pet. Co.	560
Mid-Kansas Oil & Gas Co.	130
Phillips Pet. Co.	35
Prairie Oil & Gas Co.	80
Sinclair Oil & Gas Co.	20
Skelly Oil Co.	125
The Texas Company	95
Transcontinental Oil Co.	20
Miscellaneous	620
Total	1,780

Brown

Cosden Co.	620
Humble Oil & Refg. Co.	3,740
Phillips Pet. Co.	160
Prairie Oil & Gas Co.	605
Simms Oil Co.	20
The Texas Company	510
Witherspoon Oil Co.	20
Miscellaneous	6,428
Total	12,103

Callahan

Amerada Pet. Corp.	75
Humble Oil & Refg. Co.	3
Prairie Oil & Gas Co.	800
The Texas Company	90
Texas Pacific Coal & Oil Co.	20
Miscellaneous	3,360
Total	4,348

Miscellaneous Pools

Reagan County	28,838
Clay County	668
Montague County	8,113
Jack County	230
Throckmorton County	1,416
Cooke County	365
Baylor County	148
Palo Pinto County	432
Coleman County	1,800
Scurry County	38
Mitchell County	3,527
Crockett County	1,226
Upton County	8,926
Jones County	900
Howard County	377
Crane County	306
Total	57,310

Panhandle

Carson County	4,189
Hutchinson County	116,950
Wheeler County	475
Gray County	4,648
Potter County	30
Total	126,292
Grand total	317,809

TEXAS PANHANDLE

(Continued from Page 41)

was drilling at 2,852 feet and making 15,000,000 feet of gas.

Gray County

Magnolia Petroleum Co.'s No. 6 Merten, Section 82, Block 3, was completed for 50 bbls. after a shot of 100 quarts placed at 2,938-70 feet. McMan Oil & Gas Co.'s No. 1 Worley & Reynolds, SW cor. NE, Section 83, was completed for 460 bbls. of oil and 10,000,000 feet of gas at 2,953-74 feet in granite wash. Wilcox-Pampa Oil Co.'s No. 6 Worley & Reynolds, Section 62, averaged 635 bbls. daily during the week ended last Saturday from sand at 2,938-55 feet, total depth 2,965 feet; No. 12 Worley & Reynolds, same section, produced 45 bbls. of oil and 500,000 feet of gas from sandy lime and granite wash at 2,950-3,014 feet. Young and others' No. 1 A. Holmes, Section 106, Block 3, swabbed 80 bbls. in 6 hours at 3,100-66 feet, total depth 3,183 feet. Gulf Production Co.'s No. 4 Worley & Reynolds, Section 83, Block 3, flowed 1,650 bbls. from total depth of 2,930 feet.

Wheeler County

Continental Oil Co.'s No. 1 W. C. Company was completed for 200 bbls. of 40.6 gravity crude at 2,235-90 feet. This well had the first show of gas at 2,185 feet, 4,000,000 feet of gas at 2,190 feet. It had granite wash at 2,241-68 feet.

Texas Panhandle Wildcats

Red Hill Petroleum Corp.'s No. 1 Puckett Brothers, Section 3, Homer Wade Survey, drilling at 1,500 feet, 1,000,000 feet of gas at 1,127 feet.

Carson County

Amatex Development Co.'s No. 1 Poling, Section 22, Block 2-Y, shut down at 3,190 feet. Empire Gas & Fuel Co.'s No. 1 Burnett, Section 127, Block 5, cleaning out at 3,085 feet. Gibson Oil Corp.'s No. 1 Witter, Section 1, Block 7, top lime at 2,151 feet, drilling. Humble Oil & Refining Co.'s No. 1 Burnett account 3, Section 127, Block 5, drilling at 1,530 feet; No. 1 Burnett account 4, Section 12, Block 4, drilling at 1,340 feet, Navajo Oil Co.'s No. 1 E. S. Poling, Section 22, Block 2-Y, spudding. Nunn & McAuley's No. 1 Bryan, Section 107, Block 4, rigging up. Prairie Oil & Gas Co.'s No. 1 Deahl, Section 5, Block 5, underreaming at 2,460 feet. Republic Production Co.'s No. 1 Garner, Section 103, Block 4, drilling at 2,885 feet, 10,000,000 feet of gas at 2,640-2,810 feet, 10,000,000 feet of gas at 2,860-85 feet. White Deer Oil Co.'s No. 1 Jordan, Brown and others, Section 114, Block 4, drilling at 3,042 feet, first show at 2,988 feet, 3,000,000 feet of gas at 3,042 feet.

Childress County

Gibson Oil Corp.'s No. 1 Smith, John Gregg Survey, cleaning out at 2,504 feet.

Collingsworth County

Gibson Oil Corp.'s No. 1 Williams & Combs, Section 5, Block 13, drilling at 1,500 feet. Harmon & Reams' No. 1 Scott, Section 44, Block 21, location. Martin and others' No. 1 Norwood, Section 30, Block 16, shut down at 810 feet. Von Allman's No. 1 McDowell, Section 107, Block 22, rig and tools.

Dallam County

Dalhart Oil Co.'s No. 1 James, Section 9, Block 47½, shut down at 2,865 feet. Wood & Wood's No. 1 Woods, Section 19, Block 17, shut down at 250 feet.

Donley County

A. T. Drilling Co.'s No. 1 Boyce, Section 39, Block 3-C, shut down at 350 feet.

Gray County

Archer, Blake and others' No. 1 Turneau, Section 111, Block 2-B, spudded and shut down. Bayshore Oil Co.'s No. 1 C. W. Bradford, Section 148, Block 2-B, shut down at 2,645 feet. Blackwell & McGee's No. 1 Bowers, Section 92, Block 2-B, shut down at 335 feet. Canyon Oil Co.'s No. 1 Jackson estate, Section 60, Block 2-B, drilling at 1,400 feet. Constantine and others' No. 1 Dial, Block 25, drilling at 1,925 feet. Cranfill Brothers' No. 1 T. B. Noble, Section 10, Block 6-A, drilling at 2,260 feet. H. B. Ellers' No. 1 Crews, Section 12, Block 25, rig on the ground. Empire Gas & Fuel Co.'s No. 1 B. Hughey, Section 129, Block 3, shut down at 3,000 feet, 20,000,000 feet of gas; No. 1 Wall, Section 161, Block 3, drilling at 2,100 feet. Jack Greenwood and others' No. 1 H. B. Lovett, Section 26, Block 2-B, drilling at 800 feet. Gulf Production Co.'s No. 1 Merten, Section 88, Block 3, drilling at 3,250 feet; No. 1 McConnell, Section 175, Block 3, drilling at 3,072 feet. Magdalene Oil Co.'s No. 1 J. E. Williams, Section 17, Block 1, shut down at 8[illegible] feet. Pampa Oil Co.'s No. 1 W. R. Campbell, Section 90, Block 3, drilling at 810 feet. Phillips Petroleum Co.'s No. 1 H. M. Davis, Section 86, Block 3, drilling at 1,320 feet. Henry Riley's No. 1 J. M. White, Section 212, Block 2-M, spudded and shut down. Roxana Petroleum Corp.'s No. 1 B. E. Finley, R. Chaney Survey, drilling at 2,110 feet. The Texas Company's No. 1 C. W. Saunders, Section 81, Block 3, drilling at 2,518 feet. Travis and others' No. 1 J. Back, Section 44, Block 25, rig on the ground. Weir, Kribs & Finklea's No. 1 B. F. Talley, Section 114, Block 2-M, spudded and shut down. Young and others' No. 1-A Holmes, Section 106, Block 3, granite wash at 3,183 and 3,366 feet, sandy lime at 3,166-83 feet granite wash, 80 bbls.

Hansford County

F. W. Dillard and others' No. 1 F. A. Davis, Section 50, Block 2, spudded and shut down. Oklavania Oil Co.'s No. 1 Whitson, Section 2, drilling at 1,400 feet.

Hartley County

Deep Rock Oil Co.'s No. 1 Lyman & Balfour, Section 9, Block 2, drilling at 1,560 feet. Eslick and others' No. 1 J. B. Irving, Section 13, Block 13, drilling at 1,220 feet. W. W. Holmes' No. 1 G. B. Coots, Section 58, Block X-R, drilling at 785 feet. Humble Oil & Refining Co.'s No. 1 J. M. Shelton, Section 63, drilling at 1,470 feet. J. B. McKenna's No. 1 E. S. Collins, Section 3, Block I.S, drilling at 300 feet; No. 1 Francis Farwell and others, Section 10, Block 22, rigging up and shut down; No. 1 J. M. Shelton estate, Section 29, Block 202, shut down at 650 feet. Kirk Oil Co.'s No. 1 J. M. Shelton estate, Section 1, Block 8-B spudded and shut down.

Hemphill County

Dorning and others' No. 1 Alexander, Section 1, Poitevent, shut down. Hoover and others' No. 1 Schaller estate, Section 4, spudded and shut down; No. 1 fee, J. S. Hood, drilling at 1,700 feet. Mitchell and others' No. 1 J. E. George, Section 40, Block 2-A, drilling at 900 feet. McCockrel and others' No. 1 Shaller estate, J. Fanning Survey, rig on the ground.

Hutchinson County

Gibson Oil Corp.'s No. 1 McCormick, Section 18, Block M-23, 100 feet of oil shot with 80 quarts at 3,140-60 feet, total depth 3,166 feet. Lee Flowers' No. 1 Carver, William Heath Survey, drilling at 1,200 feet. Panfield Oil Co.'s No. 1 Luginbyhl, Section 50, Block M-23, drilling at 760 feet. Sinclair Oil Co.'s No. 1 Williams, Section 43, Block 47, drilling at 2,323 feet. Sunrise Oil Co.'s No. 1 William Lydl, Section 33, Block Z, shot with 90 quarts at 2,700-63 feet, making 10 bbls.

Lamb County

E. C. Marrs and others' No. 1 Yellowhouse, Section 3, League 697, drilling at 1,724 feet.

Lipscomb County

Everett and others' No. 1 Mrs. H. D. May, Section 612, Block 43, rig and tools. McCorkle and others' No. 1 Cook, Section 899, Block 43, location; No. 1 Hampshire, Section 733, Block 43, building rig. Snyder and others' No. 1 A. Barton, Section 504, Block 43, fishing at 2,600 feet.

Moore County

Amarillo Oil Co.'s No. 1 Masterson-J. Section 59, Block O18, drilling at 1,400 feet; No. 2 Terry Thompson, Section 19, Block 44, shut down at 1,470 feet. Cadman and others' No. 1 J. T. Sneed, Jr., Section 68, Block 3, underreaming. 21[illegible] C. Shamrock Petroleum Co.'s No. 1 O.

E. Cober, Section 16, Block M-21, drilling at 600 feet. Douglas Oil Co.'s No. 1 H. W. Beauchamp, Section 112, Block 44, fishing at 280 feet. Flowers & Marland Oil Co.'s No. 1 J. T. Sneed, Jr., Section 25, Block 1, drilling at 2,380 feet. Humble Oil & Refining Co.'s No. 1 Kilgore, Section 28, Block 44, drilling at 1,150 feet. Phillips Petroleum Co.'s No. 1 Sneed, N. Jones Survey, shut down at 3,040 feet. Masters Oil Co.'s No. 1 J. T. Sneed, Jr., Section 58, Block 6-T, drilling at 580 feet. Morton's No. 1-H Rubert, Section 191, Block 3-T, drilling at 700 feet. Prairie Oil & Gas Co.'s No. 2 Sneed, Section 26, Block 6-T, drilling at 2,835 feet. The Moore County Oil Co.'s No. 1 Sneed, Section 30, Block 6-T, drilling at 1,200 feet. Shadler Brothers' No. 1 John Lowrey, Section 237, Block 44, a rig. Shamrock Petroleum Co.'s No. 1 O. E. Cober, Section 16, Block 1-M, drilling at 600 feet.

Ochiltree County

W. G. Burton's No. 1 Stickler, Section 579, Block 43, drilling at 2,600 feet. Hamilton and others' No. 1 R. B. Wamble, Section 144, Block 43, spudded and shut down for water. McCorkle Pipe Line Co.'s No. 1 R. H. Moore, Section 471, Block 43, drilling at 1,580 feet. Standard Development Co.'s No. 1 Bowden, Section 923, Block 43, drilling at 800 feet.

Potter County

Amarillo Oil Co.'s No. 5 Lee Bivins-A, Section 25, Block O18, drilling at 2,410 feet. 500,000 feet of gas at 2,375 feet; No. 1 Fuqua, Section 4, Block JAD, drilling at 900 feet. The California Co.'s No. 1 G. A. Carey, Section 6, Block Z-6. Farmers Oil & Gas Co.'s No. 1 J. A. Jones, Section 3, Block 1, spudding. Gulf Production Co.'s No. 1 W. H. Bush, Section 89, Block 9, drilling at 3,035 feet.

Roberts County

Gibson Oil Corp.'s No. 1 T. S. Jones, Section 109, Block C, drilling at 230 feet. Charles Page and others' No. 1 Hamilton tract 2, drilling at 625 feet. Murphy and others' No. 1 A. W. Gill, Section 31, Block M-2, shut down at 160 feet. Pan-State Oil Co.'s No. 1 A. H. Tandy, Section 179, Block 42, a rig. Pettijohn and others' No. 1 J. A. Meade, Section 29, Block B-1, shut down. Trammell and others' No. 1 A. H. Tandy, school land, spudded and shut down.

Sherman County

Eclipse Drilling Co.'s No. 1 Lee Bivins, Section 35, Block 2, rigging up. Get Oil Co.'s No. 1 Bivins, Section 35, Block 3-B, spudded and shut down. Phillips Petrolem and Savoy Oil Co.'s No. 1 Roach, Section 161, Block 1-C, drilling 1,260 feet.

Wheeler County

Gibson Oil Corp.'s No. 2 H. C. Phillips, Section 41, Block B-24, rig and tools; No. 4, Section 41, Block 24, drilling at 1,160 feet. Hill, Cook & Riley's No. 1 L. H. Webb, Section 61, Block 24, spudded and shut down. Laycock and others' No. 1 fee, Section 10, Block 27, drilling at 1,680 feet. Murchison & Fain's No. 1 Binkley & Cain, Section 55, Block 24, drilling at 2,400 feet, 20,000,000 feet of gas in granite wash. J. J. Rook Co.'s No. 1 T. C. Jones, Section 1, Block 24, shut down at 1,300 feet. Scott, Allen and Bledsoe's No. 1 J. H. Jackson, Section 11, Block 27, drilling at 875 feet. Scott & Varnor's No. 1 J. H. Jackson, Section 11, Block 27, shut down at 2,265 feet, total depth. Smith and others' No. 1 W. J. Johnson, Section 88, Block 5-A, rig. Smith, Brady and others' No. 1 P. J. Sorenson, Section 53, Block 4-A, shut down at 312 feet. The Texas Company's No. 1 Smith (Lewis), Section 40, Block 24, drilling at 900 feet. Texhoma Oil & Refining Co.'s No. 1 Compary, Section 12, Block 27, pay at 2,236-90 feet, total depth, 3097 bbls. Upham Gas Co.'s No. 1 Cody, Section 88, Block 17, spudded and shut down at 260 feet; No. 1 Martin, Section 89, Block 17, drilling at 225 feet; No. 1 Alexander, Section 92, Block 17, rig on the ground; No. 1 Griswald, Section 1, Block 24, rig. Woodley, Jr.'s No. 1 Woodley, Sr., Section 13, Block 5-A, drilling at 1,520 feet. Vaughn and others' No. 1 O'Gorman, Section 77, Block 7-T, drilling at 750 feet. World Oil Co.'s No. 1 Johnson, Section 11, Block 27, rig.

M. N. Long President Of Credit Managers; E. B. Mieran Secretary

CHICAGO, Oct. 2.—M. N. Long of the Galena-Signal Oil Co. of Houston, Tex., was elected president, and E. B. Moran, manager of the central division of the National Association of Credit Men, was chosen secretary and treasurer of the Petroleum Refiners Credit Managers Association at the semi-annual meeting of the association and the Petroleum Division of the National Association of Credit Men, held at the New Palmer House here September 28, 29 and 30. At the meeting, a new board of governors also was chosen, composed of C. R. Rosenberger, Sun Oil Co., Tulsa, Okla.; J. M. Judson, Sinclair Refining Co., Chicago; Robert R. Cox, Kanotex Refining Co., Arkansas City, Kans.; K. R. Hankinson, Tide Water Oil Co., New York, and W. Z. Brown, Producers & Refiners Corp., Denver, Colo.

Fifty-five leading petroleum refining organizations were represented, in several cases, by more than one of the staff. Many valuable papers were read, and the open discussions were closely followed. The 1927 spring gathering will be held in Tulsa, the date to be selected later.

The opening session was called to order by James D. Powell, assistant treasurer, Skelly Oil Co., Eldorado, Kans., retiring chairman of the board of governors. The members were greeted by J. M. Judson, chairman of the entertainment and reception committee. Mr. Judson is credit manager of the Sinclair Refining Co., and has been active in furthering the organization. The chairman's address followed, giving a general idea of its purposes as well as the necessity for better credit practices in the industry.

A feature of the forenoon session the first day was a paper by F. H. Bowman of the Pure Oil Co., Chicago, which laid particular stress on the urgent need for thorough standardization and co-ordination of credit policies and practices within the industry. The title of his address was "Fundamentals of Credit." He pointed out the necessity of having financial statements where any amount of credit is to be extended. He appealed to those present and to those not at the meeting to co-operate with the Refinery Credit Managers Association and with the National Association of Credit Men in joint effort to bring about a higher standard of ethics in handling of credit problems.

At the luncheon at which a number of guests were present, J. M. Woodruff, western sales manager of the Sinclair Refining Co., presented an address on "The Relations of the Sales and Treasury Departments," pointing out the necessity of close co-operation between these departments as well as the important part the treasury department can play in increasing the turnover and production. Mr. Judson was toastmaster.

A leading address at the afternoon session Tuesday was that of J. W. Hallman, representing the Sun Oil Co. of Philadelphia. His subject was "Terms of Sale and Cash Discounts." "That there is a wide variance in practice in the industry is a matter of common knowledge and much latitude is taken by some refiners in regard to terms as well as discounts allowed." Mr. Hallman said: "According to some credit men there is as much debate and shopping around for terms and discounts as there is for prices on major products. Particular emphasis should be laid on the need of having uniform terms and cash discounts. Credit is a system of exchange and if we inflate it, it becomes just as dangerous as does the undue inflation of the nation's monetary system. It may be good business for the oil companies to bid for new trade largely on the basis of who can give the most liberal terms of sale, the largest and longest cash discount privileges but I doubt the wisdom of such policies from a financial standpoint." Mr. Hallman claimed the adoption and application of uniform terms and cash discounts would result ultimately in lower prices to the consumer.

A feature of the second day was the address of Dr. F. W. Dignan of the La-Salle Extension University, regarding the use of letters for collecting slow accounts.

"Opening New Accounts" was handled in an open forum by Robert R. Cox, Kanotex Refining Co. and M. D. Creel of the Marland Refining Co. The many sides to the problem and the perplexities which beset the credit department when a new account is opened brought out a general discussion.

W. E. Brown of the Producers & Refiners Corp. reviewed the development of credit department activities. His arguments seemed conclusive that the work of the credit departments had been an important, if not the chief, factor in the elimination of waste and the increase of turnover.

For some time the Group Three Industry has maintained a bureau for the exchange of credit information at Tulsa and representatives of Tulsa oil companies have spoken at this meeting of the value of the service. E. B. Moran, manager of the central division, National Association of Credit Men, and manager of the Tulsa Bureau, explained its operation and how its services should be used by tankcar shippers in curtailing unjustified credits.

"Establishing of Credit Limits" was the subject of a paper by Frank L. Bunn, credit manager of the Tidal Refining Co. of Tulsa, which was very interesting to those present. It was agreed that a careful survey should be made of all new and prospective customers with a view to establishing the limits of credit to be granted and that the willingness to pay must be considered as well as the ability to meet obligations. O. M. Mayberry of the Champlin Refining Co. led the discussion.

The Thursday session was concluded with the luncheon after a number of addresses and officers for the coming year announced. "Retail Credits" were discussed by H. G. McLean of the Empire Refineries, Inc., the discussion being led by G. C. Goller of the Lubrite Refining Co., St. Louis. L. E. Cook of the Marland Refining Co. treated "Service and Bulk Sation Credits."

L. V. Nicholas of the National Petroleum Marketers Association addressed the meeting in a general talk on the industry and the importance of good credit management. He said it should not be necessary for the credit departments to sell themselves to the sales and executive departments.

NEW YORK STANDARD'S EXPANSION PROGRAM

NEW YORK, Oct. 2.—Standard Oil Co. of New York, in addition to handling the largest volume of business it has ever had, is effecting this year what is probably its biggest expansion program in properties.

Much of the expansion is occurring in its two main subsidiaries, Magnolia Petroleum and General Petroleum Corp., with millions being spent for additional production, leases, pipelines, refineries and marketing facilities.

To date, most of the money has been spent in enlarging the activities of Magnolia Petroleum. Upward of $30,000,000 has been or is in the process of being spent on Magnolia property expansion and acquisition.

The first big acquisition by Magnolia was last June, when $15,000,000 was paid for producing properties in the Luling (Tex.) Field, where Magnolia now has practically all of that pool's 22,000 bbls. daily production.

Expansion of refinery facilities has been extensive, with $5,000,000 having been spent at the big Beaumont refinery alone, which thoroughly modernized it and brought its cracking facilities from 27,000 to 40,000 bbls. daily, giving it a total throughput of 70,000 bbls. daily. Additional cracking facilities are being installed at smaller plants, notably Fort Worth. To keep crude oil production or available oil in balance with expanding refineries, Magnolia has been one of the most active developers in the Gulf Coast, Arkansas and general Texas district. Pipeline facilities have been expanded appreciably, with $3,000,000 having been spent on a 30,000-bbl. line from Smackover Field in Arkansas, direct to the Beaumont plant. Another major pipeline expansion is a 180-mile extension from Luling clear down to the Mirando Pool on the Rio Grande border of Texas. This gives Magnolia a direct pipeline from the extreme southwestern oil development in Texas to its Beaumont refinery.

Expansion of General Petroleum Corp., the California subsidiary, is planned, calling for enlarging that company's refinery as well as its storage facilities. General Petroleum recently has been buying producing properties.

While in its regular marketing territory Standard of New York has never gone in for company owned stations, reports recently from parts of its territory, particularly up-state New York, are that it has been buying service stations there from others.

Through its own and subsidiary operations, New York now has one of the widest flung territories in the oil business, and perhaps the widest among old Standard Oil units. Its original territory was New England, New York and the Far East. Through Magnolia it markets in Texas, Oklahoma, Kansas, Arkansas, Louisiana and New Mexico, while General Petroleum's plants are to market all over the Pacific Coast.

UNIFIED OPERATION TALK IN SALT CREEK

One result of the Federal Oil Conservation Board's report, the Wall Street Journal says, may develop in the Salt Creek Field of Wyoming by operators there pooling interests in the second Wall Creek sand for joint operation on that horizon.

The first Wall Creek sand production is all held by Salt Creek Producers Association and Mountain Producers Corp., but the second Wall Creek horizon extends beyond the leases of these two, and is held by a number of companies, including Salt Creek Producers and Mountain Producers.

The second Wall Creek area covers about 22,000 acres and development has reached a point where it is fully defined and wells are on the pump. Efforts are now under way seeking for a unified operation of this area and the introduction of dry gas into the wells, under compressed air pressure, in order to increase the yield from the producing sands. Unifield operation is necessary because of the number of lease holders and the fact that any gas introduced to better production would reach out beyond the property of the company doing it and, therefore, help production on the next lease without cost to the owner.

Several wells of the Midwest Refining Co. have had air introduced and production results show that this is a practical measure to increase crude oil yield. Besides the diversity of lease holders, the fee on the land is held by three classes of owners, the Federal Government, State of Wyoming (which has the famous 640-acre section), and private parties.

In its discussion of unit operation to prevent unnecessary competitive drilling, the Oil Conservation Board stated that voluntary co-operation of the various land owners and operators was the best method to get economic operation and larger recovery in fields under development. However, the case of the second Wall Creek is one where this particular sand has been fully drilled—the deeper Lakota sand in Salt Creek Field has not been fully developed—and scientific methods of production are proposed to be introduced to get better yield of oil.

The board's report refers to such unified operation in a single field as being of such character that the possibility of monopolistic control need not be feared, as it would be a relatively small unit of operation in comparison with the entire country.

CRUDE OIL PRICES

(Continued from Page 347)

Ohio Oil Co. Both companies post Grass Creek light and Elk Basin.

EASTERN STATES

Joseph Seep Purchasing Agency

(Effective March 8)

Penna Grade Oil in New York Transit Lines (New York)	$3.40
Bradford District Oil in National Transit Lines (Pennsylvania)	3.40
Penna Grade Oil in National Transit Lines (Pa.)	3.30
Penna Grade Oil in Southwest Pa. Lines (West Virginia)	3.30
Penna Grade Oil in Eureka Pipe Line Lines (Pa.)	3.25
Penna Grade Oil in Buckeye Pipe Line Lines (Ohio)	3.05
Cabell Grade Oil in Eureka Pipe Line Lines (West Virginia) (May 17)	2.40
Corning Grade Oil in Buckeye Pipe Line Lines (Ohio) (May 22)	2.55
Somerset Medium Oil in Cumberland Pipe Line Lines (Kentucky) (May 17)	2.50
Somerset Light Oil in Cumberland Pipe Lines (Kentucky) (May 17)	2.65
Ragland Grade Oil in Cumberland Pipe Line Lines (Kentucky) (May 19)	1.25
Gaines (Pennsylvania) (Apr. 27)	2.85
Keister (Pennsylvania) (Feb. 15)	2.30

MIDDLE WESTERN STATES

Ohio Oil Co.

(Effective May 17)

Lima	$2.48
Wooster	2.55
Illinois	2.37
Indiana	2.25
Princeton	2.37
Plymouth	1.90
Waterloo	1.35
*Western Kentucky (Sept. 8)	2.10
†Cumberland, Barren and Monroe Counties, Ky. (May 17)	2.65
‡Oil in lines of Stoll Oil Refg. Co. in Oil City, Ky.	2.65
‡Oil in lines of Stoll Refg. Co. in Tinsley Bottom, Tenn.	2.46
§Oil Springs (Canada) (May 18)	2.95
§Petrolia (Canada) (May 18)	2.88

*Posted by Indian Refining Co.
†Posted by Paragon Development Co.
‡Posted by Stoll Oil Refining Co.
§Posted by Imperial Oil Co., Ltd.

MEXICO

(Effective May 13)

*Tuxpam light (f.o.b. Mex. ports)	$1.35
†Panuco heavy (f.o.b. Mex. ports)	1.15
Tuxpam (New York)	2.15
Panuco (New York)	1.80

*Plus 32.328c tax. †17.631c tax.

REFINERY MARKETS CONTINUE INACTIVE

(Continued from Page 30)

not general as with the majority business continued very dull.

A bearish factor on the market has been the two reductions, each a half cent, in export prices posted by the Standard Oil Co. of New Jersey for aviation gasoline. The second reduction Monday followed the first by only a week. This places the net price paid Oklahoma refiners for 64-66 375 gasoline at 10.05 cents. This is practically the same price the U. S. Motor (58-60 437) grade is bringing.

This naturally caused a more disturbed tone in gasolines so far as the export situation is concerned. However, the market on higher gravity gasoline is such that export contract reductions mean less and less to domestic buyers, as the latter buyers when needing material will pay higher prices asked by refiners curtailing cuts of these grades rather than sell on the contract basis.

There has been considerable talk of a possible substantial reduction in crude runs to stills this month that production might be decreased in line with consumption. So far no definite figures have been compiled. A few refiners are known to have reduced runs but, on the other hand, there have been some increases.

There also is some uncertainty as to the true statistical situation of the Mid-Continent as a result of several weeks of extreme slow shipments. The United States Bureau of Mines figures just announced for August show that stocks on the last day of the month were 10,767,000 bbls. less than on the last day of July, but trends during September, judging from market conditions, may have been changed considerably.

Although some market students are of the opinion that refined prices are practically at bottom, it is not considered likely that if there is a turn and an improvement in the situation that there will be much advance in prices, barring sensational developments. Both sellers and buyers look for a steady market. There may be some additional reductions if crude and tankwagon prices are cut and some advances if there is an improvement in demand but all changes are expected to be only comparatively slight.

The fact that refiners are operating on a very narrow margin of profit, if any, at present crude prices is expected to check further declines in refinery markets as there will be more and more of a tendency to reduce operations, and possibly shut down plants, the longer present conditions exist. And the lower prices go the more resistance will be offered to reductions.

This was indicated the past week in gasolines when buyers, who attempted to break the 10-cent level of U. S. Motor (58-60 437) material found little success, with refiners apparently preventing any reduction below that mark, either for resale or to the trade. Some gasoline classed as U. S. Motor was purchased under that figure but this was found in most cases not strictly up to grade. Some refiners still were getting business Tuesday at 10¼ cents. The reduction in export postings of higher gravity material also failed to break the 10-cent U. S. Motor price. The 64-66 375 and the 60-62 400 grades, however, were weaker and uncertain because of the reduction, but Monday and Tuesday this had had little effect on the lower gravity gasolines. Several refiners reported getting as high as 11¼ cents for the 64-66 375 gasoline for domestic sale even Tuesday but plenty of material was available under this mark down to 10¾ cents. But there was little moving at any price.

Several domestic buyers were in the market for 60-62 400 gasoline but no important amount being taken up and prices paid in some instances were as low as those asked for the U. S. Motor material. One buyer in particular found this gasoline at 10¼ cents, basis Group 3, over the remander of the week.

There was some demand for naphthas and these products were bringing from 9⅞ to 10 cents.

Natural Gasolines and Blends

Natural gasolines experienced a very sharp weakening during the week as apparently too much material became available, resulting in frequent concessions. Naturals were available easily Tuesday as follows: Grade A and Double A, 9½ cents with few sales higher; Grade B and Double B 9⅛ to 9¼ cents, and Grade C, 9 cents. Inquiries were few. Some 64-66 blended gasoline was reported purchased at 9¾ cents.

Kerosene and Distillates

There was very little change in the kerosene and distillate situation. The 41-43 water white kerosene was offered freely Tuesday from one-half to three-fourths cent under prevailing markets a week ago. There was little demand for the product even at the 7¼ to 7½ cents quoted. The 42-44 grade was quoted at 7⅞ to 8 cents.

Distillates continued firm in price although all grades were more free than they have been for some time. There has been an excellent demand for furnace oils in the northern states but these requirements seem to have been taken care of well by distributors who bought earlier in the season.

Fuel Oil and Gas Oil

A slightly steadier tone in fuel oils was felt the past few days but quotations Tuesday were generally 2½ cents lower than a week ago, with low grades available from $1.25 to $1.30; 22-26, $1.30; 24-26, $1.35 to $1.37½; 26-30, $1.45; and 28-30, $1.55. The fact that there still is not an excessive amount of fuels on the market is largely responsible for the resistance offered concessions as there is very little demand.

A number of refiners reported buyers were showing considerably more interest in fuels Monday and Tuesday with many inquiries for quotations coming in but a continuation of the warmer weather which opened the week may hold back a renewed buying activity, experienced during September and August. Although inquiries for quotations were fairly active for some refiners, little actual trading was done.

Bearish market students do not feel that fuels will become stronger the remainder of the year, pointing out that during the period of high price and scarcity of all grades many consumers turned to other fuels and now are out of the market, and with gasolines experiencing a seasonal decline there will be less call for higher gravity fuels for cracking purposes.

The gas oil market showed little change. Prices generally were reported soft although buyers with instructions had difficulty in filling their orders for good material of required specifications at prevailing quotations in the Group. The weakness in Oklahoma, as explained at other times, really is one of quotations only, due to cheap material offered in other refining centers. However, dark or cracked gas oil was more than plentiful, this perhaps being responsible for the weak tone in gas oils as a whole.

Lubricants and Wax

A marked falling off in demand for lubricants was felt the past week by some manufacturers but movements generally were better than at this time a year ago. A few refiners even had a better demand for neutrals than in the previous week although this was not the general situation. Prices were steady. Wax inquiries were more active but bids were all below the market idea of Oklahoma manufacturers.

CHANGES IN A. I. M. E. PROGRAM OF MEETING, TULSA, OCTOBER 11-14

Some changes in the program of the petroleum division of the American Institute of Mining and Metallurgical Engineers at the meeting in Tulsa on October 11-14 have been announced by F. Julius Fohs, chairman.

They are as follows:

Discussion on "Advantages of Unit Operation"—James H. Gardner, Gardner Petroleum Co.

Discussion on S. F. Shaw's paper, "Gas Lift Flowing of Wells in the Mid-Continent District"—P. H. Hutchcraft of Clark Brothers and Hollis P. Porter of the Gypsy Oil Co.

"Methods of Increasing Oil Recovery in the Mid-Continent Field"—E. O. Bennett, Marland Oil Co.

"Problems Involved in the Use of Tret-O-Lite as Applied in the Mid Continent Fields"—C. H. M. Roberts of William S. Barnickel & Co., St. Louis, Mo.

"Theory of Normal Production and Theory and Methods of Introduction of Gas and Air for Increasing Recovery"—L. L. Brundred, National Supply Co.

"Results Obtained From an Engineering Study of the Powell Field"—H. B. Hill, U. S. Bureau of Mines.

Discussion: "Steel Bit"—Harry Pennington, Freeport Sulphur Co.

PREMIUM ON SUNBURST

LEWISTOWN, Mont., Oct. 4.—The Arro Oil & Refining Co. has posted a premium of 10 cents a barrel for Sunburst, Mont., crude. The present posted price of this crude is $1.25.

VIRGINIA GASOLINE TAX

RICHMOND, Va., Oct. 4.—August gasoline tax receipts in Virginia totaled $640,116, a record for any one month. This was an increase of $1.479 over the $638,637 collected during July.

NEW MANISTEE STATION

CHICAGO, Oct. 4.—The Campeco Oil Co., distributing subsidiary of the Camden Petroleum Co., is preparing to add to its service at Manistee, Mich., where it has a large station. A site has been purchased and plans are being prepared for the new station which will be ready in early spring.

NEBRASKA GASOLINE TAX

LINCOLN, Neb., Oct. 4.—August receipts from the state gasoline tax totaled more than $322,000, the largest ever reported. July receipts were $315,000. During the 20 months the state tax of 2 cents has been in effect a total of $4,242,000 has been collected.

Eastern Guests of Skelly Oil Co. Are Banqueted in Tulsa

As a fitting climax to a trip through portions of the Kansas, Oklahoma and Texas fields as the guests of the Skelly Oil Co. a party of eastern financiers and financial writers were banqueted at the Mayo Hotel in Tulsa Friday evening, October 1.

Among the guests were a number of Tulsa oil men and bankers and representatives of the Skelly Oil Co.'s executive, producing, refining and marketing departments. William G. Skelly, president of the Skelly Oil Co., presided and addresses were made by Mr. Skelly, Vice President C. C. Herndon, J. F. Nagle of the Skelly organization; Frank Henderson, president of the Rubber Exchange, New York, and Timothy Walsh, assistant financial editor of the New York World.

The visitors departed for the East Saturday.

The eastern men who took part in the trip were James P. Maher, assistant financial editor, New York American; Timothy Walsh, assistant financial editor, New York World; John Hawthorne, financial editor, New York Evening Journal; E. Walter Mockler, financial editor, New York Commercial; Patrick McAvoy, financial department, New York Journal of Commerce; Leonard M. Fanning, New York, The Oil and Gas Journal; Keith Fanshier, Chicago Journal of Commerce; George Hammond, Chicago Tribune; Philip P. Brown, Brown & Guest, New York; Thomas J. Megear, Luke, Banks & Weeks, New York; William B. Anderson, Block, Maloney & Co., New York; A. T. Ferrell, director Skelly Oil Co., Saginaw, Mich.; Tracy Turner, Jr., S. B. Chapin & Co., Chicago; Nelson B. Nelson, S. B. Chapin & Co., New York; L. G. Sheafer, Jesup & Lamont, New York; Guy B. DeChadenedes, G. B. DeChadenedes & Co., New York; Mortimer F. Stern, J. S. Bache & Co., New York; John J. Whelan, Carstairs & Co., Philadelphia; Frank Henderson, president Rubber Exchange, New York; David G. Wells, Palmer & Co., New York; Leroy Lance, Wall Street Journal; Robert Thorn, New York Central Railroad; W. A. Stickney, Venyven & Co., St. Louis; Glenn Ford McKinney, New York.

MARKETING EXPANSION IN MINNEAPOLIS AREA

MINNEAPOLIS, Minn., Oct. 4.—The development of the oil distribution business in this district is indicated in the expansion of marketing companies here in the last few months. The Texas Company and Sinclair Oil Co. each have consolidated various offices here making Minneapolis division headquarters. The Pure Oil Co. has enlarged its offices and moved part of its force from Columbus, Ohio, here while the Standard Oil Co. of Indiana has announced plans for a new building to be constructed near the heart of the business district to house its division offices.

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The Leidecker Tool Co.
Casper,Wyoming.

Dear Glen ;

Enclosed find my check for the spiral bits which you shipped to me recently.

I was having lots of trouble with crooked holes in the Edwards Lime Stone which was full of crystallized boulders. After using the spiral bits and getting the hole straight my troubles were over for the bits are giving perfect satisfaction.

I am down here on the Mexican border trying to develope an oil field. So far I have drilled one well and am 1350 Ft. in this hole and expect the pay if any in the next 700 Ft. I am also starting another well close to Del Rio Texas sometime soon.

This well here at Sanderson is a wild, wild cat but I believe there is going to be lots of drilling in this part of the country in the next year.

Thanking you for past favors and with kindest regards

I am yours truly

E. T. Williams

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Measurement of Crankcase Dilution

Recent Perfections in Capillary Funnel Method by Bureau of Standards Adds to Accuracy and Simplicity of Tests

By T. S. Sligh, Jr.*

This approximate method has been developed to afford an easy, rapid means of measuring the percentage of fuel diluent in used crankcase oils. Results are usually less than 1 per cent in error and seldom so far as 2 per cent out.

The method has been in use in the automotive laboratory of the Bureau of Standards for about two years and satisfactory apparatus for the test is now commercially available. There seems to be a need for a suitable, simple method of measuring dilution and this description has been prepared to meet the many requests which have been received for information regarding this method.

The apparatus used consists of one 250-cc. distillation flask, one capillary funnel, one 350-watt embedded type electric heater or suitable gas burner, one condenser, one 100-cc. graduated cylinder, 5 grams No. 3 steel wool, one cork to fit flask, one wire hook to handle steel wool and one wire probe No. 24 or 26 B&S gage to pass through capillary.

Flask—This is the 250-cc. Saybolt distilling flask as specified for A.S.T.M. method D158-25T with about 6 cm. of end of vapor tube turned down to meet vertical condenser, as shown in blueprint in which principal dimensions are also indicated.

Funnel—This is a stock 60-degree funnel about 4 cm. across top with a stem from 4 to 8 cm. long, to which is sealed a 6-cm. length of capillary tubing having a bore of 0.06 cm. ±0.01 cm. A small hole 1 to 1.5 mm. diameter, drilled about 1 cm. above top of stem (see figure) to take care of flooding with oils showing high dilution is convenient but not essential.

Heater—This is of the embedded Bureau of Mines[1] type formed to fit the flask bottom as shown in the figure and having a capacity of about 350 watts. Apparently distributed heat is desirable as a bare wire heater run at high temperatures gives high results due to cracking of the oil.

Condenser — A metal condenser with central tube about 1 cm (⅜ in.) or less in diameter and having at least 15 cm. (6 in.) jacketed with water at a temperature below 30 degrees Centigrade (86 degrees Fahrenheit), or a glass condenser of 20 cm. (8 in.) jacketed length, gives adequate condensation. If the condenser jacket has a capacity of 75 cm.[3] or more, circulation of water is not necessary except for continuous use or where the sample contains considerable water. A straight condenser set at an angle of 75 degrees with the vertical may be used with a flask having a straight vapor tube if desired.

Receiver—This is an ordinary 100 cc. graduate.

Steel Wool—This is No. 3 grade, coarse, formed into a cylinder which fits snugly into the flask neck and extends from outlet of vapor tube almost to the bottom of the flask.

Operation

Electric Heating—Connect heater to 110-volt mains (or 220-volt if heater is designed for that voltage). Measure 100 cc. of the oil to be tested into the flask and place steel wool in neck with top just below vapor outlet. Cork flask tightly and when heater is hot (about 15 minutes) place flask on heater with vapor tube entering condenser, no seal is necessary at this point, and place graduate and funnel as shown. Distillation will begin in from one to three minutes. If much diluent is present the funnel will fill rapidly and overflow into graduate through the small hole. If the funnel does not have this hole it should be moved to one side until the excessive flow of distillate begins to slacken, and then replaced.

As the distillation proceeds the level of liquid in the funnel stem will drop until it is very near the top of the capillary or it may drop below this point and entrain air bubbles in the capillary. Finally as the oil begins to distill over, the head of liquid on the stem will begin to rise rapidly due to the increased viscosity of the oil and the increased rate of distillation.

The volume, number of cubic centimeters, of distillate in the receiver, corrected for the water which may have distilled, at the time the rapid rise of head takes place, is taken as the percentage of diluent in the original charge. Usually during this period the head increases 2 or 3 cm. by the time one cubic centimeter has run into the graduate so that the endpoint is sufficiently definite.

The flask may now be taken from the heater and when partially cooled the steel wool removed with a small wire hook, set aside to drain for the next test, and the warm oil allowed to drain from the flask.

Gas Heating—In this case the procedure is as above except that the gas burner is adjusted to cover the lower one-third or one-fourth of the flask with a slightly yellowish flame. A "hard" flame with a well defined cone is undesirable and a shield should be used to guard against ignition of the distillate.

After the period of flooding is over the rate of heating should be so adjusted as to maintain a head of about 1.5 cm. (½ in.) on the capillary. Towards the end of the test when this head tends to drop the heat should be increased gradually to oppose this action. With high boiling oils the drop will probably persist until air bubbles are trapped. The rate of heat supply should be such that the rapid rise occurs in not more than 3 minutes from the time entrainment of bubbles starts. Too little heat will permit excessive cracking of the oil and high apparent dilution results will ensue. A setting of the gas flame which will evaporate a charge of water from the flask at a rate of about 5 cc. per minute is usually satisfactory. The test should require only about 15 minutes.

Accuracy—The capillary funnel method may be expected to give results certainly with less than 2 per cent error with the oils ordinarily encountered in automobile crankcase use. Usually results are within 1 per cent; that is, an indicated dilution of 15 per cent is likely to be within the limits 14-16 per cent. Reproducibility of results with a particular sample are within 1 per cent.

Checking

If the operator desires to check the accuracy of his results with a particular type of oil, synthetic mixtures of known dilution may be prepared by mixing say 85 parts of the new oil with 15 parts of diluent to give a mixture containing 15 per cent of dilution.

A diluent which approximates closely enough that found in used oils consists of the residue remaining in the flask when 50 per cent of a 200 cc. charge of commercial gasoline is distilled off in the crankcase dilution apparatus. It will be found that the error of the results will depend upon the type of lubricating oil used, being least, not more than 1 per cent high, with the medium viscosity low-boiling oils and seldom greater than 2 per cent with the high-viscosity high-boiling oils such as those containing considerable quantities of cylinder stock.

It should be noted that high results do not indicate that the new oil contained any diluent but are due to slight cracking of the oil resulting from the high temperture required to distill off all the added diluent.

Special Notes

Water—Water is often present in samples of used crankcase oil and interferes to some extent with the distillation. The presence of water in the oil is evidenced during distillation by sharp popping sounds and miniature explosions in the oil. If much water is present the contents of the flask may froth up and, if not prevented, pass as froth through the vapor tube to the condenser. Sometimes also droplets of water condensing on the cooler parts of the flask will drop back into the hot oil and vaporize with considerable violence.

Ordinarily appreciable amounts of water will not be found in summer samples or in samples of oil in which the dilution does not exceed 10 to 12 per cent. If it is not desired to evaluate water the sample may be allowed to settle overnight after which a practically water free portion may usually be poured off the top for distillation.

If wet samples must be distilled or if water is shown by excessive frothing during distillation the addition of two or three drops of castor oil to the charge will tend to suppress foaming and permit the distillation of quite large percentages of water. In exceptional cases it may be necessary to reduce the rate of distillation temporarily by switching off the heat, raising the flask a short distance (¼ to ½ inch) from the heater, or reducing the gas supply until the water has been distilled off. This is indicated by the disappearance of foam from the surface of the oil in the flask and a hissing or cracking sound in the vapor tube and condenser due to the contact of hot vapor with condensed water.

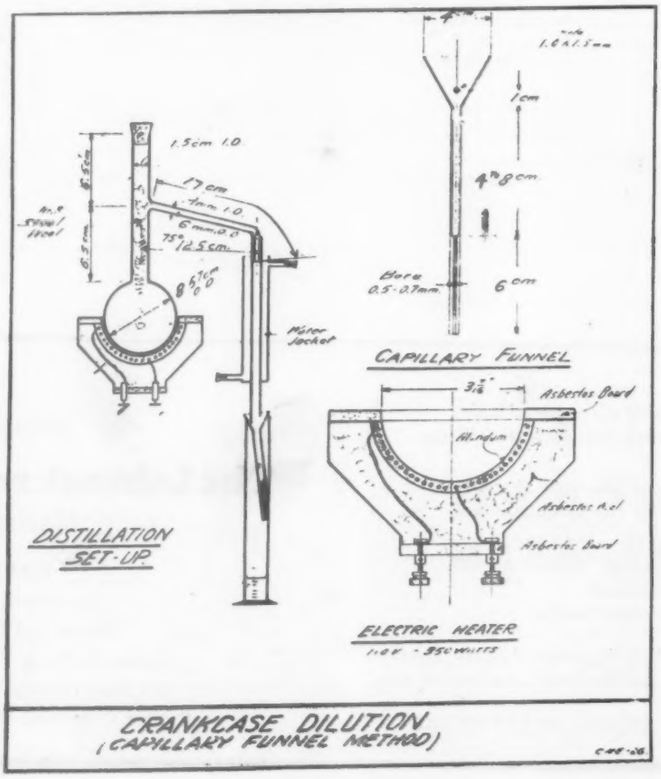
Water often carries over traces of sludge which tend to clog the capillary consequently the small wire probe should

IMPROVED TEST

Additional explanatory material representing the most recent description of the Bureau of Standards test for the "Measurement of Crankcase Dilution—Capillary Funnel Method" is contained in the accompanying article prepared by T. S. Sligh, Jr., physicist, Bureau of Standards, and published by permission of the Director of the Bureau of Standards, Department of Commerce.

The basic portion of this statement is a reprint of letter circular 200 of the bureau, which originally appeared in The Oil and Gas Journal, May 21, 1925, page 127. This complete description, with the additional explanatory statement, offers a reliable guide to those who may desire to use this method.

Announcement was also made during the past week that Mr Sligh, Jr., has resigned as physicist with the United States Bureau of Mines to join the research staff of the Studebaker Automobile Corp. Mr. Sligh's new work will be along the same line of research as that with the Government bureau, of interest both to the automobile and oil industries.



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[1]Bull. Bureau of Mines No. 207.

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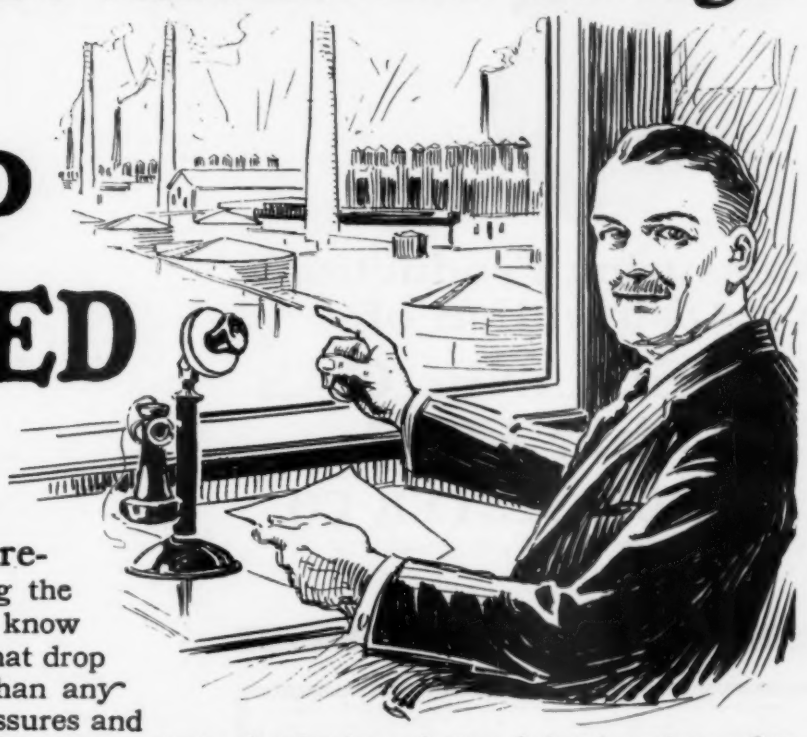

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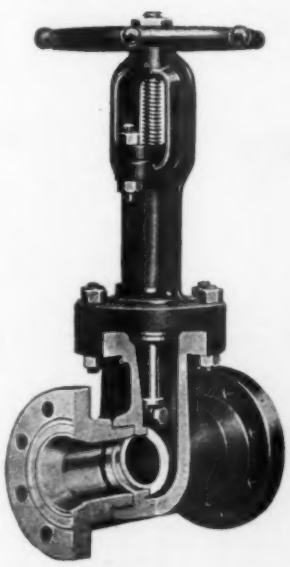

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be used to keep the bore clear, especially when wet oils are being distilled.

Cleaning Flasks

It is not necessary to clean the flasks after each test as draining when hot is sufficient since the residual oil contains no diluent. If the flask is rinsed out with gasoline, however, it must be thoroughly dried before use. The black deposits which are built up in the flasks by continued use may be removed by filling the flask with alcoholic caustic soda solution, allowing to stand over night (heating the solution will accelerate the action) and rinsing out with water and coarse sand. This cleaning solution may be made up by taking a water solution of sodium hydroxide (ordinary lye as sold in tin cans for household use is equally effective) containing about 50 per cent by weight of the hydroxide and diluting this to about four times its volume with pure or denatured ethyl alcohol.

The cleaning solution may be reused almost indefinitely but should be kept stoppered to prevent loss by evaporation.

Theory of the Method

The diluent in crankcase oils ordinarily consists of constituents from the last half of the fuel distillation range. The bulk of this material approximates in composition that coming off at about the 85-90 per cent point of the Engler distillation.

This material has lower boiling points than even the light fractions of the oil and is decidedly less viscous. Consequently when a diluted oil is distilled the first portions coming over will be largely diluent and will be of low viscosity but a pronounced increase in viscosity will occur when the oil begins to come over.

In the distillation it is, however, desirable to get some fractionation of the vapor to effect better separation of oil and diluent. This is promoted by a moderate rate of distillation and by the use of the steel wool which also helps to prevent dropping back of water with very wet samples.

The head of liquid on the capillary is proportional to the rate of flow of distillate from the condenser, to the viscosity of the distillate and to the resistance which the capillary offers to the passage of distillate. This resistance of the capillary is proportional directly to its length and inversely to the fourth power of the diameter of the bore. Consequently bore size must be kept within reasonable limits.

In the test as specified the rate of supply of heat in the electrical method, and the rate of distillation with gas heating are kept approximately constant so that for a given capillary the change in viscosity due to the presence of considerable amounts of oil in the distillate will show up as an increase in head of distillate on the capillary.

Amount of Cracking

Petroleum lubricating oils will crack or decompose at high temperatures giving a low viscosity product and a carbonaceous residue. Unfortunately with the oils of higher boiling points the temperstures necessary to distill off all of the diluent fall within the lower range of cracking temperatures. The heavy steam-like vapor issuing from the condenser near the end of the test is evidence of cracking.

The amount of cracking produced is a function of both the temperature and the time so that a very slow rate of heating in this region leads to more cracking than a faster rate and for this reason insufficient heat supply at this time will lead to excessively high apparent dilution. (See section on "Gas Heating".) On the other hand, a too fast rate of heating will lead to error due to insufficient fractionation of the vapor. The specifications for the method, rate of heat supply, size of capillary, etc., have been chosen to give optimum results over the ordinary range of oils in common use. In the electrical method the requirements as to rate of heating are taken care of by the capacity and construction of the heater. Consequently this is the preferable method, especially in the hands of unskilled operators. Concentrated heat as from a sharply defined gas cone or an electric heater where there is direct radiation from very hot wires seems to produce high local heating in the film of oil adhering to the flask wall and so lead to cracking and to erroneous, high results.

Federation of Labor Condemns Increase in Oil Tax in Oklahoma

OKLAHOMA CITY, Okla., Oct. 2.—(Special)—Organized labor of Oklahoma, through its delegate convention, just adjourned at Ponca City, without a single dissenting voice adopted resolutions condemning State Question 138, Initiative Petition 89, the gross production oil tax bill, which is to be voted on at general election November 2.

By this action the State Federation of Labor, every local union in the state is pledged to exert its best efforts toward defeat of the initiated bill at the polls.

The resolution reads:

"Whereas there are a number of submitted measures to be voted on by the people of Oklahoma at the general election in November, some of which propose to increase taxes and at least one of which is regarded as dangerous to the welfare of this state because of its tendency, if adopted, to slow up oil development work and construction in which organized labor is so much interested, and will have a tendency to increase the army of unemployed in our state.

"Now, therefore, be it resolved by the twenty-third annual state convention of the State Federation of Labor that we go on record as opposed to the proposed oil tax bill as unnecessary because we have a surplus in the state treasury at this time and as unjust because oil and its products are already paying the major portion of our state revenue, and to increase the gross production tax unnecessarily and unjustly would tend to stop the flow of new capital into the state for development and construction purposes and that the executive board of the State Federation of Labor be instructed to lend their individual and collective support to this resolution.

"And we recommend that our members and friends vote "No" on State Question 138, otherwise known as Initiated Petition 89."

The action of the Federation swells the tide of opposition to the oil tax bill already condemned by the platforms of both Republican and Democratic parties and in the editorial columns of all but a half dozen of the state's 400 daily and weekly newspapers.

VALUATION INCREASED

OKLAHOMA CITY, Okla., Oct. 2.—The State Board of Equalization of Arkansas has increased the valuation of utilities of the State over $5,000,000 to a total of about $120,000,000. Oil and gas pipeline companies shared in the increase. These valuations were made: Standard Oil Pipe Line Co., Inc., $3,906,110; Arkansas Natural Gas Co., $2,314,224. the Texas Pipe Line Co., $370,500. Twin City Pipe Line Co., Fort Smith, $237,478; Southern Pipe Line Co., Shreveport, $197,083; Shreveport-El Dorado Pipe Line Co., $140,095; Crusader Pipe Line Co., El Dorado, $138,345; Crusader Pipe Line Co. of Louisiana, $67,712; Central States Gas & Electric Co., El Dorado, $62,528; Arkansas Transit Corp., Shreveport, $69,960; the Speith Oil & Pipe Line Co., El Dorado, $9,220.

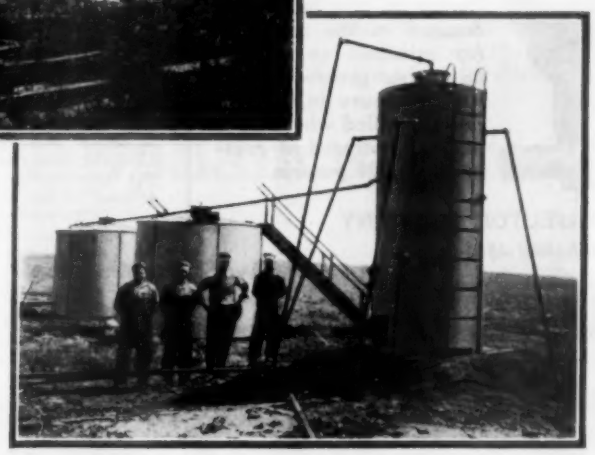
IN WESTERN JEFFERSON COUNTY

WAURIKA, Okla., Oct. 2.—That area along Red River west of Waurika, Jefferson County, that geologists for a long time have predicted would produce oil, is soon to get another test. E. B. Howard, of Tulsa, will drill the well. He has a block of leases secured and the state land office has agreed, at his request, to advertise for lease the southeast quarter of Section 21-5s-8w. The location, Howard said, would be within a quarter mile of the line of the state land.

Butler Bolted Tanks of the White Eagle Oil & Refining Co., Linamood Farm, 19-24-11, Greenwood County, Kansas.

Butler Bolted Tanks of Ralph Day, Fuller Farm, 1-22-10, Greenwood County, Kansas.

Butler Bolted Tanks of the Kansas Oil Corporation, Pixley Farm, 5-22-10, Greenwood County, Kansas.



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Drane Tank Company, at Tulsa and Holdenville, Oklahoma; Eldorado and Madison, Kansas.

M. A. Trimmer, at Blackwell, Oklahoma.

Southern Steel Co., at San Antonio and Mirando City, Texas.

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CRUDE OIL IN STORAGE IN TEXAS TAKES BIG DROP IN 9 MONTHS

HOUSTON, Tex., Oct. 2.—A review of the statistical situation with reference to stocks of crude in storage in the fields in Texas, Louisiana and Arkansas fails to reveal anything that could be considered as a menace to prices.

The Gulf Coast division is the only one showing a material change in surplus stocks between August 1 and September 1. The Spindletop Pool is responsible for an increase of 1,873,465 bbls. during the 30-day period mentioned. Tank storage at Spindletop itself shows a decrease of 139,935 bbls., but that is explained by the fact that Spindletop crude has been pumped to storage in the other pools.

Stocks in the southwest fields dropped off 72,795 bbls., the largest withdrawals during August being from the Luling Field by the Magnolia Pipe Line Co. The Humble Pipe Line Co. is now running an average of 10,000 bbls. per day from the districts in Duval, Jim Hogg and Webb Counties, pumping it to its water terminal at Engleside, near Corpus Christi.

North and East Central Texas

Stocks in the north and east central Texas division as of September 1, total 22,754,650 bbls., which is a decrease of 2,347,270 bbls. compared with August 1. The Breckenridge and Ranger districts declined 93,340 bbls. in the 30-day period. Withdrawals from the Mexia storage aggregated 733,590 bbls. and from the Powell storage 1,383,650 bbls. were withdrawn, showing that much of a shrinkage between August 1 and September 1.

Accumulations in Reagan County (Big Lake Field) aggregate 586,995 bbls., an increase of 15,215 bbls. over August 1. The Panhandle districts are credited with 3,780,000 bbls. in stocks.

North Louisiana and Arkansas

Accumulations in the north Louisiana and Arkansas fields total 40,688,775 bbls., or 1,465,280 bbls. less than on August 1. Stocks in the Smackover Field decreased 1,169,190 bbls., while the El Dorado Field shows a slight increase. A total of 150,680 bbls. appeared to have been withdrawn from the tanks in the Haynesville, (La.) Field.

On May 1, stocks in the north Louisiana and Arkansas fields totaled 46,290,265 bbls. Stocks in the north and east central Texas fields, on the same date were 27,227,820 bbls.

The following table shows the changes since December 1, 1925.

Divisions—	Stocks Bbls. Dec. 1, 1925	Sept. 1, 1926
Gulf Coast	14,217,640	13,323,940
N. Cen.-E. Texas	31,885,950	22,754,650
N. La.-Ark.	49,967,410	40,688,775
Southwest Fields	787,305	13,246,625
Panhandle Fields	.....	3,780,000
West Texas	.....	586,995
	96,858,305	82,358,965

SOUTHWEST FIELDS

(All Steel Storage)

Field—	September 1	August 1
Luling	558,625	686,025
Lockhart	41,000	11,395
Mirando	725,000	700,000
Totals	1,324,625	1,397,420
Decrease	72,795	

NORTH AND EAST CENTRAL TEXAS

Field—	September 1	August 1
Eastland and Stephens	9,267,900	9,361,240
Burkburnett	568,170	761,000
Electra	280,900	361,880
Archer County	153,950	128,950
Vernon	95,680	19,950
Petrolia	32,100	31,750
Nocona	62,000	12,000
Powell	2,372,000	3,755,650
Mexia	9,921,950	10,655,540
Currie	.....	12,980
Totals	22,754,650	25,101,920
Decrease	2,347,270	

WEST TEXAS AND PANHANDLE FIELDS

Field—	September 1	August 1
Reagan County	586,995	571,780
Increase	15,215	
Panhandle	3,780,000	No compar.

NORTH LOUISIANA AND ARKANSAS

Field—	September 1	August 1
Smackover (Ark.)	23,716,170	24,885,360
El Dorado (Ark.)	2,586,735	2,561,480
Nevada County, (Ark.)	293,510	465,400
Homer, (La.)	4,189,570	4,073,835
Haynesville (La.)	3,872,300	4,022,980
Crichton, DeSoto, Bull Bayou	5,522,375	5,555,660
Bellevue	209,585	217,400
Cotton Valley	249,745	307,000
Urania	48,785	65,340
Totals	40,688,775	42,154,455
Decrease	1,465,280	

Miscellaneous Stocks

There are 6,212,586 bbls. of light gravity crudes in addition to that listed as Gulf Coast in storage at tank farms in the Coastal region. Compared with August 1, this is an increase of 668,021 bbls.

Comparisons with August 1, are as follows:

HIGH GRADE STOCKS

Company, Storage at—	September 1	August 1
Humble Oil & Refining Co., Raytown	1,727,536	1,718,960
Humble Oil & Refining Co., Webster Tank Farm	1,623,000	1,033,800
Sinclair Refining Co., Sinco	371,910	398,715
Republic-Galena, Norsworthy	404,000	334,645
Galena-Humble, Englewood	1,329,270	1,213,290
, Texas City	235,000	282,000
Crown Central, Pasadena	155,900	243,660
Gulf Production, Lynchburg	92,225	84,125
Gulf Production, Crosby	155,900	145,830
Gulf Production, Almeda	107,845	89,600
	6,212,586	5,544,565

The following tables show the stocks in steel and earthen storage as of September 1:

COASTAL CRUDE IN STORAGE SEPTEMBER 1, 1926

Districts	September 1 Steel Tanks	September 1 Earthen	August 1 Steel Tanks	August 1 Earthen
Sour Lake	2,038,500	2,182,400	1,782,190	2,026,000
Humble	624,865	1,966,740	49,700	1,295,000
West Columbia	1,321,600	1,010,920	1,275,220	1,070,160
Spindletop	1,748,295	.....	1,888,220	.....
Orange	255,000	366,000	233,460	363,180
Hull	454,600	45,960	49,700	292,060
Goose Creek	136,800	33,000	86,460	73,760
Pierce Junction	40,850	68,000	27,440	29,850
Saratoga	334,000	.....	327,650	.....
Big Creek	103,160	.....	76,000	.....
Jennings, (La.)	55,150	.....	44,000	.....
South Liberty	41,000	.....	32,500	.....
Vinton, (La.)	236,675	.....	207,140	.....
Markham	9,000	.....	10,000	.....
Batson	3,500	.....	3,000	.....
Damon Mound	11,300	.....	10,935	.....
Barber Hill	885	.....	880	.....
Dayton	3,870	.....	5,000	.....
Anse La Bute, (La.)	550	.....	500	.....
Lockhart, (La.)	142,320	.....	88,530	.....
Totals	7,560,920	5,663,020	6,198,565	5,149,870
Totals, September 1	13,223,940			
Totals, August 1	11,348,425			
Increase	1,874,515			
Stocks in steel storage increased, bbls.				1,362,365
Stocks in earthen storage increased, bbls.				513,150

An Oil Man from the East —was visiting in California

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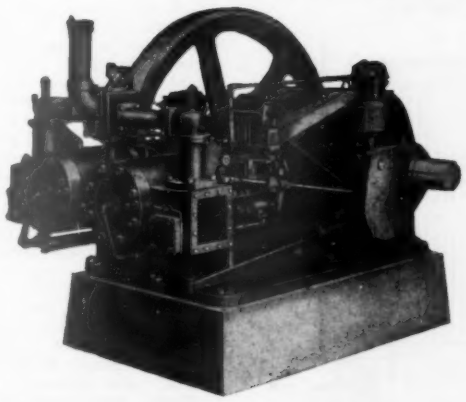

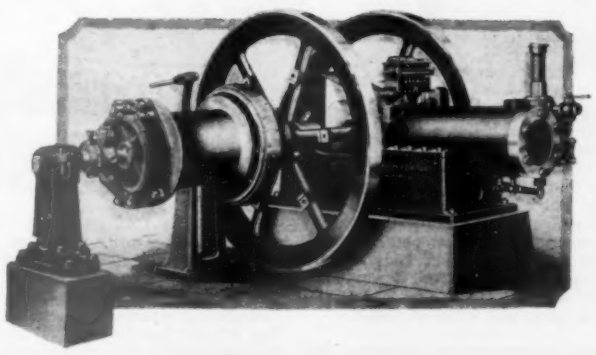

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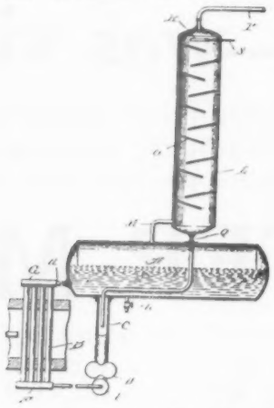
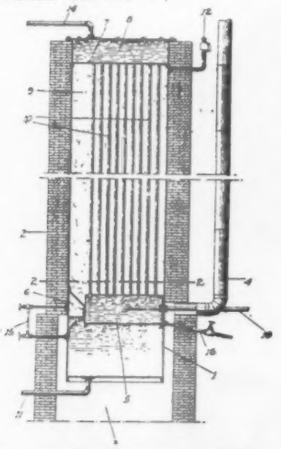
Recent Patents

1,598,136. Process of Cracking Hydrocarbons. Eugene C. Herthel, Chicago, Ill., assignor to Sinclair Refining Co., Chicago, Ill., a corporation of Maine. Filed July 12, 1922. Serial No. 574,380. 16 Claims. (Cl. 196—47.)



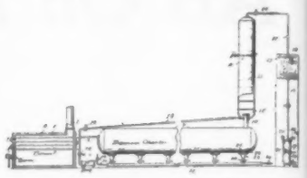
2. A process of cracking higher boiling point hydrocarbon oils to form lower boiling point hydrocarbon oils which consists in subjecting a body of the oil to be cracked to distillation under superatmospheric pressure and at a cracking temperature, maintaining said cracking temperature during the main portion of the run and effecting the vaporization under substantially undiminished pressure, feeding in fresh stock during a portion of the run in quantity sufficient to prevent the pitch formed by the cracking process exceeding the saturation point in the body of oil undergoing distillation, and continuing to feed stock and drawing off pitch-laden oil from the said body of oil during a further portion of the run in amounts conjointly regulated to prevent the proportion of pitch in the body of oil undergoing distillation rising above the saturation point in the said body of oil and in the pitch-laden oil as withdrawn.

1,597,337. Oil Dehydrator and Cleanser. Luther T. Arnold, Reward, Calif. Filed May 5, 1925. Serial No. 28,275. 2 Claims. (Cl. 196—5.)



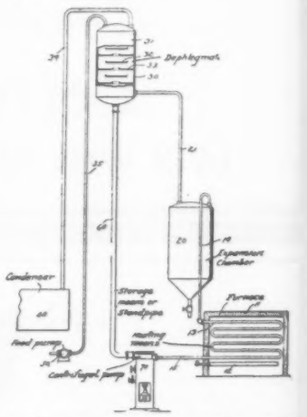
2. An oil dehydrator comprising a vertically disposed boiler, a fire box thereunder, an intake oil chamber in the boiler spaced from the lower end and from one side thereof to allow communication from the boiler below the chamber to the area thereabove, passage means projecting upwardly from the chamber, a chamber with which the upper ends of said passage means connect and forming an enclosure with the sides of the boiler, and an outlet from said upper chamber.

1,598,368. Apparatus for Cracking Oil. Gustav Egloff and Harry P. Benner, Chicago, Ill., assignors to Universal Oil Products Co., Chicago, Ill., a corporation of South Dakota. Filed March 22, 1921. Serial No. 454,846. Renewed January 14, 1926. 3 Claims. (Cl. 196—107.)



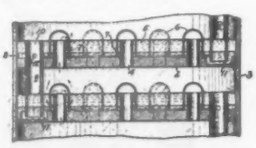
1. In an apparatus for cracking oil, the combination with a heating coil, of an expansion chamber connected thereto, said expansion chamber taking the form of a large elongated shell and provided with a plurality of valve controlled residuum drawoffs and a residuum header connected to the drawoffs, and means for forcing fluid under pressure through the header to rapidly withdraw residuum from said expansion chamber.

1,597,821. Regulating Apparatus for Cracking Stills. Daniel Pyzel, Piedmont, Calif., assignor to Simplex Refining Co., San Francisco, Calif., a corporation of California. Filed June 25, 1924. Serial No. 722,296. 3 Claims. (Cl. 196—48.)



1. In an apparatus for cracking oil, the combination with a heating coil, of a reacting zone in communication therewith, a reflux condenser, means for delivering heated vapors from said reacting zone to said reflux condenser, a condensate storage receiver, means for delivering reflux condensate to said receiver, and mechanical pressure applying means acting in response to the level of condensate in said storage receiver for automatically forcing said condensate through the heating tube in a quantity varying with the level of condensate maintained in said storage receiver.

1,598,772. Bubble Tray. Forrest E. Gilmore, Los Angeles, Calif., assignor, by direct and mesne assignments, of one-sixth to Frank Ahlburg, Los Angeles, Calif., and one-sixth to William K. White, San Francisco, Calif. Filed April 11, 1925. Serial No. 22,429. 7 Claims. (Cl. 196—139.)



4. A bubble tray on which liquids accumulate and stratify according to their specific gravity, a weir on said bubble tray to regulate the depth of the accumulated liquids, and means on said tray including an aperture to permit the draining of the heavier liquids accumulated thereon without disturbance of the normal level of the lighter liquids.

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SUMMARY OF CALIFORNIA OIL FIELD OPERATIONS FOR AUGUST, 1926

According to figures collected by the American Petroleum Institute, Pacific Coast office, the total production of crude oil in California for August amounted to 18,765,080 bbls., an average of 605,325 bbls. per day. This is an increase of 707 bbls. per day over July production.

Total stocks of crude and all products in Pacific Coast territory decreased during the month 1,746,688 bbls. The total stocks at the end of the month were 146,255,084 bbls. The total stock decrease for 1926, up to August 31, was 11,061,225 bbls. Comparative figures as of August 31, 1926, July 31, 1926, and August 31, 1925, are shown in detail on the second page of this report.

Fifty-five wells were completed during the month with an initial daily production of 18,067 bbls., compared with 68 wells completed during July with an initial production of 27,582 bbls.

PRODUCTION

(Figures of production and stocks are in barrels of 42 gals.)

District—	Bbls. per mo.	Daily Average Aug., 1926	July, 1926	Aug., 192
Kern River	356,586	11,503	11,297	17,61
McKittrick	162,174	5,231	5,332	5,77
Midway-Sunset	2,893,963	93,354	93,964	101,76
Elk Hills	1,079,222	34,814	33,948	27,22
Lost Hills-Belridge	142,963	4,612	4,605	4,55
Coalinga	602,813	19,446	19,908	22,62
Wheeler Ridge	33,396	1,077	1,065	96
Watsonville	1,783	58	58	5
Santa Maria	155,065	5,002	4,786	7,89
Summerland	3,995	129	129	12
Ventura Avenue	1,450,880	46,803	43,025	19,35
Ventura-Newhall	188,595	6,084	6,007	6,23
Los Angeles-Salt Lake	57,275	1,848	1,842	2,03
Whittier	62,086	2,003	2,038	1,99
Fullerton	581,628	18,762	17,040	13,84
Coyote	510,381	16,464	16,607	20,06
Santa Fe Springs	1,499,992	48,387	48,900	53,85
Montebello	559,807	18,058	18,498	17,97
Richfield	543,472	17,531	14,388	11,73
Huntington Beach	1,375,629	44,375	43,732	44,11
Long Beach	3,111,013	100,355	106,143	106,27
Torrance	870,246	28,072	28,208	36,81
Dominguez	680,550	21,953	20,951	29,55
Rosecrans	425,576	13,599	15,618	23,12
Inglewood	1,386,547	44,727	46,504	104,31
Newport	1,468	47	28	12
Seal Beach	31,989	1,032	.....	.....
Total	18,765,080	605,325	604,619	677,59
July	18,743,199	604,618	.....	.....
Increase	21,881	707	.....	.....

STOCKS

	Aug. 31, 1926	July 31, 1926	Aug. Stock Decreases	Aug. 31, 1925
Heavy crude, heavier than 20° A.P.I., including all grades of fuel	88,452,937	88,362,629	*90,308	79,602,28
Refinable crude, 20° A.P.I., and lighter	32,152,958	33,548,115	1,395,157	41,216,02
Gasoline	10,421,903	10,450,418	28,515	9,687,15
Naphtha distillates	4,755,297	4,955,313	200,016	6,418,15
All other stocks	10,471,989	10,685,297	213,308	9,356,29
Total all stocks	146,255,084	148,001,772	1,746,688	146,279,91

*Increase.

DEVELOPMENT

District—	New Rigs Up	Active Drilling	Completed	Daily Initial Output	Active Producing	Aband. Wells Drillers	Aband. Wells Producers
Kern River	6	17	2	300	1,345	1	..
McKittrick	..	4	1	60	306	..	..
Midway-Sunset	6	37	13	1,444	2,978	..	..
Elk Hills	..	2	..	.....	242	..	..
Lost Hills-Belridge	..	3	..	.....	307	..	..
Coalinga	2	5	1	36	971	..	..
Wheeler Ridge	1	1	1	188	26	..	..
Watsonville	..	..	..	.....	6	..	..
Santa Maria	..	6	..	.....	231	4	..
Summerland	..	..	..	.....	135	..	..
Ventura Avenue	7	30	1	2,512	64	..	..
Ventura-Newhall	1	30	1	220	519	1	..
Los Angeles-Salt Lake	..	..	..	.....	376	..	..
Whittier	1	6	1	55	191	..	..
Fullerton	3	14	2	2,519	433	1	..
Coyote	..	1	..	.....	214	..	..
Santa Fe Springs	1	4	1	25	348	..	1
Montebello	4	7	3	550	182	..	..
Richfield	6	14	4	4,123	192	2	..
Huntington Beach	45	38	4	1,390	367	..	1
Long Beach	20	29	8	1,669	751	6	7
Torrance	3	3	7	658	650	1	..
Dominguez	..	1	1	600	73	..	..
Rosecrans	1	6	1	240	129	3	3
Inglewood	2	..	2	226	200	..	1
Newport	1	2	..	.....	6	..	..
Seal Beach	1	1	1	1,252	1	..	..
Miscellaneous drilling	9	120	..	.....	..	5	..
August	120	381	55	18,067	11,245	24	13
July	73	367	68	27,582	11,273	14	10
Increase	47	14	*13	*9,515	*28	10	3
Average for year 1925	105	417	79	42,247	11,393	26	13
Average for year 1924	103	510	103	42,412	10,903	28	21
Average for year 1923	111	749	82	114,690	8,926	24	
Average for year 1922	116	605	67	43,700	9,410	17	
Average for year 1921	90	536	57	15,631	9,425	14	

DRILL IN OKLA. PANHANDLE

BOISE CITY, Okla., Oct. 2.—The second deep test for oil in Cimarron County is to be started soon by J. R. Phillips and associates who have leased 10,000 acres of segregated grazing land from the state. The block adjoins one of 10,000 acres of state land leased to the Sinclair Oil Co., which also is under contract to drill a well to completion before next April.

An extension of six months in the time granted to the Sinclair has been voted by the state land office. This followed an understanding in which the Sinclair company will join in the Phillips test on a structure that covers the southern part of the Phillips block and the northern part of the Sinclair block.

A test being drilled in the county by W. R. Ramsey and brother of Oklahoma City on another 10,000 acre block of state land, has reached a depth of 1,750 feet. Red beds still are in evidence.

ALBANIA'S GEOLOGY

Arthur Huber Redfield, geologist of Washington, D. C., writing in Engineering and Mining Journal, of the possibilities of oil and gas in Albania, says they appear to be confined to the younger and more moderately folded Tetiary and upper Mesozoic beds of the Epirote ranges and the Malakastra and the upper Tertiary of Lower Albania. In general, the flat dome-shaped folds of the Lower Albania, such as the Muzakhya Plain, offer favorable geologic conditions for the accumulation of oil and gas. Six concessions were granted in 1925 to foreign companies; the Anglo-Persian Oil Co. having been drilling since October.

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The Baker Float Shoe is designed for those operators who prefer a back pressure valve at the end of the string with all the strength and safety of a Baker Float Collar, which is usually placed one joint from bottom.

The Baker Cement Shoe is used where the string of casing is so heavy that it is advisable to set on the bottom, *also* where there is no choice. It differs from the Float Shoe in that the opening in the guide is plugged, the holes being drilled in the shoe below the valve, through which the cement can be ejected. The flare at the bottom of the Baker Plain Shoe tends to center it in the well and the holes in the shoe are left free and open as an outlet for the cement. Both devices are adaptable to all conditions.

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COLOMBIAN YEAR BOOK DEVOTES MUCH SPACE TO OIL DEVELOPMENT

By N. O. Fanning

New York Bureau, The Oil and Gas Journal, Room 543, 30 Church St., New York City

NEW YORK, Oct. 2.—The Year Book for 1925-26, prepared by Abraham Martinez, director of the Colombia Government Bureau of Information in New York, has just been issued. It contains extremely valuable information with regard to all features of Colombian business and economic development, including petroleum, which is dealt with in much detail.

In addition to treatment of Colombian oil laws, it deals with petroleum and petroleum development at length.

Oil Deposits of Colombia

The oil deposits of Colombia, the Year Book states, extend over an area of about 34,000 square miles, of which hardly 3 miles have been sounded by drills. The oil regions of Colombia may be divided into seven zones, as follows:

(1) The Caribbean Coast, from Rio Hacha to the Gulf of Uraba.

(2) The northern part of the Department of Notre del Santander, around the Catatumbo River; this petroleum zone extends from the east of the eastern Cordillera of Colombia to the Lake of Maracaibo in Venezuela.

(3) The region covered by the Tropical Oil Co. De Mares concession, in the Department of Santander, on the eastern bank of the Magdalena River.

(4) The region between the Sinu and San Jorge Rivers, on the slopes of the Central Cordillera, partly in the Department of Antioquia and partly in the Department of Bolivar.

(5) The eastern parts of the Departments of Antioquia and Tolima, on the western banks of the Magdalena.

(6) The region to the west of the city of Popayan, in the Department of El Cauca, also the region between the town of Quibdo and Cali.

(7) The plains of San Martin and Casanare.

There are also traces of oil to the west of Medellin, in the western part of the Valley of El Cauca and on some of the ridges of western Cordillera.

With the exception of the two last-mentioned zones, all of the aforementioned regions have been intensively exploited. The companies interested in oil have made careful and costly research of each of these regions.

Despite the large territory covered by these zones, exploitation on a commercial scale has been carried on only in the case of one concession, the so-called De Mares concession of the Tropical Oil Co., a subsidiary of the International Petroleum Co. of Canada.

Drilling

Drilling has been started in the territory adjacent to the Magdalena River by the Tropical Oil Co., Granada Oil Corp., Colombia Syndicate and Transcontinental Oil Co. In the Departments of Atlantico and Bolivar, the following companies have drilled for oil: Colombian Oilfields, Ltd., Latin American Corp. of Colombia, South American Gulf Oil Corp. and the Standard Oil Co. of New York. Drilling has also started on the famous Barco Concession of the Department of Notre de Santander by the Colombian Petroleum Co.

Tropical Oil Co.

The Tropical Oil Co. "DeMares" concession is located in the Department of Santander, from the Sogomoso River at the north to the Carare River to the south, with 30 miles of frontage on the Magdalena River, and 65 miles, more or less, inland. The concession takes in about 533,000 hectares of land, but the rights of third parties are protected and does not include the subsoil, which remains the property of the nation.

The Tropical Oil Co. has its offices, employes' dwellings, warehouses, machine works, etc., in the town of Barranca Mermeja, on the shores of the Magdalena River, near the mouth of the Colorado River. During the rainy season, small launches are able to navigate the water of the Colorado, between Barranca Mermeja and the oil wells, situated at the junction of the Colorado and Oponcito Rivers, 30 miles to the southeast of Barranca Bermeja.

For about 4 to 5 miles around the River Magdalena, the lay of the land is flat, but from there on it is very irregular and mountainous.

The Colorado River is not navigable during the dry season of the year, and in view of this, the Tropical Oil Co. has opened a road from Barranca Bermeja to the wells. Besides this, there is an oil pipeline 6 inches in diameter which connects the wells with Barranca Bermeja. The length of the pipeline and road is about 35 miles.

The oil refinery which has been established at Barranca Bermeja has a capacity of 2,000 bbls. a day, which is sufficient to supply the whole country with gasoline, kerosene, lubricants and other oil derivatives. These products, in accordance with a contract signed by the Government and the company, are to be sold at rates not exceeding those quoted for similar articles in the New York market.

Barranca Bermeja is about 400 miles from the Atlantic Coast and 300 miles from Bogota, the capital of the Republic.

The land where the wells are located is called "Las Infantas." In this region, the geologists have located about 50 wells. Of these, some are producing and others are closed by stop valves, awaiting the opening of the oil pipeline which is to take the product to the seacoast. (This pipeline is now operating.) The greatest depth at which oil has been found is 2,940 feet. In 1923, the average depth to which wells were drilled was 1,997 feet.

The first three wells that produced oil on these lands had depths of 1,700 feet, 1,900 feet and 2,300 feet, respectively, and are several hundred yards from each other. The oil flows without the use of pumps and production can be figure at from 6 to 8,000 bbls. a day each.

Due to the lack of means of transportation, production of the Tropical Oil Co. has been limited to usable quantities. Output has been as follows: In 1921, 66,750 bbls.; 1922, 322,786 bbls.; 1923, 424,870 bbls.; and 1924, 500,000 bbls.

Colombia Syndicate

The field of the Colombia Syndicate is in the Department of Santander, in land bordering on the Lebrija River. It has rented oil lands of about 400,000 hectares in area, to private parties.

The central point from which this company works is Llaneros, about 150 miles from the mouth of the Lebrija. In Llaneros there are about 20 buildings used as offices and warehouses.

The wells are located in a stretch of country known as La Tigra and there is a road of about 14 miles in length between La Tigra and Llaneros. Both places are in telephone communication with the port of Santos. There are nine wells in La Tigra.

Granada Oil Corp.

The Granada Oil Corp. has drilled an oil well at a point known as Roman and is now drilling another at Nato (Department of Magdalena).

Transcontinental Oil

The chief center of operations of this company is at Bodegas de Bogota, Districts of Guadas and Guataqui, Department of Cundinamarca. The company has drilled three wells. The first, between Guaduas and Bodegas de Bogota, the second between Guataqui and Jerusalem and the third near Guataqui, on the shores of the Magdalena.

Colombian Oilfields

Colombian Oilfields, operating in the coastal district of Colombia, drilled seven wells some time ago, and three more recently and is working on another. Up to the present, much gas and some oil

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Illustration shows an American (formerly Columbia) Recorder on a gas line in the Lucky Field, near Wetumka, Oklahoma. It gives an accurate, *written* record of the pressure of the natural gas at all hours of the day or night.

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has been found, but not in commercial quantities.

Latin American Petroleum Corp.

This company is drilling a well at Bajo de Osos, in the District of El Carmen.

Colombian Petroleum Co.

The Colombian Petroleum Co. operates the Barco Concession. In 1918 the company obtained permission from Venezuela to transport some machinery through Maracaibo and drilled a well on the right shore of the Rio de Oro, 10 miles above the junction of the Oro and Catatumbo Rivers, near the Venezuelan border (Department of Santander del Norte).

Drilling on this well was begun in December, 1919, with a small drilling machine. Oil was found almost continually, from the surface down to a depth of 890 feet, but after that no progress could be made due to the fact that the machinery was not strong enough. About 1,500 bbls. of oil a day shot from this well.

This important work has been entirely discontinued, as the Government of Venezuela has stopped permission to ship machainery via Maracaibo. The well was carefully plugged.

ELECTRIC FLOW METER ENTIRELY NEW PRINCIPLE

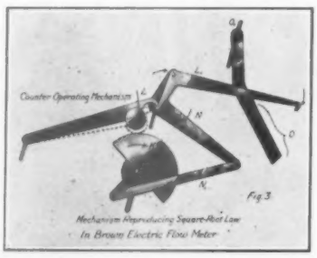
(Continued from Page 68)

ing when it is desirable to determine the total flow for a day, or during any hours, without having to watch the counter.

The entire integrator mechanism with its individual recording pen can be mounted in the standard recorder case along with the recording mechanism, avoiding the necessity of a separate integrator case.

Principle of Operation

As shown in Figure 1, manometer A operates in response to differential pressure caused by flow of the fluid through an orifice B. When the rate of flow increases, mercury is depressed in chamber A1 and rises in chamber A2, these differences in mercury level in the two chambers being a measure of the rate of fluid flow through the orifice in accordance with well-known principles. When the flow increases from zero to a maximum, a float which rides on the mercury surface in Chamber A1 is lowered from



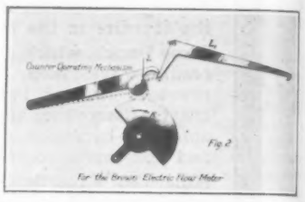
the position indicated by dotted lines to a lower position as indicated by the solid lines. The float is made of non-corrosive metal and chamber A1 has a moulded bakelite lining, ribbed on the inside, insuring freedom of action at all times. An armature C of transformer iron is supported by the float on a non-magnetic rod D, and the armature is raised and lowered in accordance with the motion of the float.

This armature travels inside of a rust-proof, non-magnetic tube which has high electrical resistance and great mechanical strength. The pressure of the fluid being metered is confined within this tube and the electrical inductive winding EE1, which is slipped over the outside of the tube has excellent magnetic linkage with the armature which moves inside. At the same time, the coil is under atmospheric conditions only and is protected by a cover F.

The outer ends of the divided winding EE1, are connected directly across the service mains of an alternating current supply line and connections are run from these ends directly to the outer ends of a similar divided inductance coil FF1, which operates an indicator H, and also to divided inductance coil GG1, operating a recording instrument 1. Armatures are hung on counterbalanced arms J and K, in the two instruments. The points of connection between the two parts of divided coils EE1, FF1, and GG1, are all connected together by a neutral wire P, and when thus connected the coils form the self-adjusting inductance bridge which is the outstanding basic feature of this flow meter.

When the armature in the manometer is raised or lowered by a change in fluid flow, the relation between the voltages across the two parts E and E1, of the winding will be changed. This causes the currents in the two parts FF1, of the indicator coil, and also the currents in the two parts GG1, of the recorder coil, to become unequal, as a result the armatures of the indicator and recorder move to new positions corresponding to the position of the armature C, and the meter readings are adjusted accordingly by means of the gearing or linkage shown.

The armature of the instruments moves with the motion of the manometer armature as the latter is moved up and down by the mercury float. Since the positions assumed are such that the relative voltages across the two parts of each coil



are the same, the operation of the instrument is independent of the actual value of the line voltage. No current flows in the neutral wire and the currents in the two halves of each divided coil are equal except when the armatures are being moved.

The Integrator

To make use of the simple inductance bridge method, a special type of integrator was developed which increases the counter readings in proportion to the square root of the angular deflection of the recorder pen arm, this being the relation of flow to the pressure differences across the orifice. Attached to the gear which drives the recorder chart is a sector of a disc K, (Figure 2) which rotates at a constant rate. A roller L_1 is normally held up by latch L1, out of contact with the sector. The latch is tripped when the sector is in different positions, depending upon the rate of flow, and the roller is rotated through an angle proportional to the rate of flow before the sector passes out of contact with it. After the sector passes beyond the roller the latter is again latched up by L1, and the process repeated at regular intervals.

The square root relation existing between rate of flow and pressure differences (the latter being translated into recorder pen travel) is reproduced in the relation between angular travel of disc L, and pen deflection by means of the oscillating latch carrier N, being driven by the rotating sector K, through a link N1, shown in Figure 3.

Tripping blade O, which is attached to the recording pen shaft O1, releases the latch at the proper point, according to the reading of the instrument, the motion of the pen never being restricted by the tripping operation.

The angular relation between the uniform rotation of sector K, and the rocking motion of arm N, is an almost exact reproduction of the square root law through a large portion of the downward motion of arm N, and a slight departure from the exact relation desired is taken care of by the shape of tripping blade O. A roller on the end of arm N, passes across tripping blade O, which is very thin, and holds O fast against a plate while latch L1, is being tripped.

The square root relation is always reproduced correctly and, such a simple integrating mechanism which reproduces

the square root relation permits the employment of the inductance bridge method of transmitting the meter reading.

When roller L, has turned through a definite number of revolutions a pawl is released which engages a toothed pinion of the chart-driving gear train. This causes a cam Q, Figure 4, to make one complete revolution after the pawl is released and the cam then remains at rest until the roller again completes the proper number of revolutions.

As the cam Q, advances, a cam arm R, is gradually raised, lifting the arm of ratchet counter S, until the high point Q1, of the cam passes, then the cam arm falls quickly and advances the reading of the counter by one unit without allowing the figures to pause in a halfway position difficult to read.

Each time the cam arm falls the recording planimeter pen T, makes a jog U, in its record line, every tenth jog U1, being in the opposite direction to facilitate counting when desired. The five-figure integrator dial S, can be read at any hour or hours, and records made on the

Counter and Recording Planimeter For the Brown Electric Flow Meter

chart or elsewhere if desired; but the record of the recording planimeter can take the place of these counter readings and affords the advantage of making a record from which the total flow can be read off for any desired fraction of a day at any subsequent time—eliminating the necessity of having an observer on hand.

Series of Charts

A series of printed charts are chosen with a fixed ratio between successive ranges. The manometers also are arranged to be adjusted for several appropriate ranges. This simplifies the choice of an orifice plate, the size of which depends chiefly upon the density of the fluid and the pipe size. With such an orifice the apparatus is easily adjusted for successive chart ranges by using a stand-pipe of proper size in the manometer. This is useful where the average load changes from time to time, for then the apparatus can be readjusted by changing the manometer stand-pipe—instead of changing the orifice plate which is much less convenient.

The various manometers for use with steam, operate on successive maximum pressure differentials increasing by intervals of about 60 per cent, ranging from 1.6 inches to 16 inches of mercury. There are six ranges, the choice of a manometer depending upon velocities encountered. Any manometer may be converted into the most sensitive one by simply opening a valve. This adapts the meter for use with one of the lower range charts, making it convertible for low load periods.

Where the apparatus must work on very low pressure differentials an especially sensitive type of manometer is provided, which gives full deflection of the meter on a pressure difference of one-half inch of water, although the operating force of the meter mechanisms of this high-sensitivity series is as great as that of the high-range manometers.

ROTARY SHALE RETORTS

The possibility of successfully retorting oil shale in retorts of the rotary type in which the charge is kept moving and thus receives a uniform heating throughout, is reported to have been solved by the Jura Olschiefer Werke at Holzeheim, Gottingen, Germany. In Brennstoff-Chemie, E. Fleischmann supplies some information regarding this German process. A plant with rotary retorts of the Thyssen A. G. construction was installed to treat 80 tons of shale daily. In a 30-day working test of the plant, the generators were proved to give a gasification efficiency of 60 per cent, which, considering the nature of the fuel, is satisfactory. During the 30 days, totaling 639.66 working hours, 76,400 cubic meters of retort gas passed through the benzine recovery plant yielding 5,940 kilograms of benzine.

MARLAND'S VIEW OF REAGAN COUNTY SUIT

Commenting on the suit brought by Attorney General Moody of Texas against oil companies operating in the Reagan County Field, E. W. Marland, president of Marland Oil Co., states:

"The suit instituted by the State of Texas against a number of companies, joining our Reagan County Purchasing Co., will not in my judgment be embarrassing to that company. We have been buying oil from the state lands at a price which at all times averaged the price paid by the major purchasing companies for similar grade of crude oil in the Mid-Continent. Full investigation will disclose that our contract with the producers has resulted in the State receiving more for its royalty oil than it could possibly have received had no such contract been made.

"The other questions involved affect the other companies and do not affect Reagan County Purchasing Co. I will be glad to see them passed upon by the courts. There is no question that each of these companies acted in the utmost good faith toward the State and I think it is deplorable when a question of law needs to be settled between the Government and a corporation that the zealous partisans of the Government think it seemly to accuse corporate officials of improper conduct.

"The principal question is whether a certain department of the State had the right to make an oil lease on its Reagan County lands and if it had the right, to which particular department of the State Government the income from the lease should go. It is purely a question of law and I have no doubt the courts will find the department acted within its authority."

Allegations in Petition

The suit filed in behalf of the state and the University of Texas, asks for cancellation of leases held by the Texon Oil & Land Co., and associated companies, which operate on University of Texas lands, and which have paid in one eighth royalties, approximately $4,300,000 into the university's permanent fund.

The board of regents informed the attorney general that one of the companies was formed from the majority stockholders in some of the others, and that in the sale and resale of the oil that the university was losing part of the one eighth royalty. The case is set for hearing in the October term.

The petition alleges that the Reagan County Purchasing Co., Inc., as a corporation subsidiary to the Texon Oil and Land Co., has purchased practically all oil produced by the Texon, Group Number One and Group Number Two, at an average market price at which the oil was sold to the Humble company and the Marland company and at lower gravity ratings than the resale gravity rating.

The petition alleges that a close interdependent relationship exists between the various companies and "was so effected by the said defendants with the intention and purpose of depriving and defrauding the plaintiff, the state of Texas, of its legal and rightful royalty due to it under and by virtue of the leases on said lands * * * that the same has accomplished the said fraudulent design."

The action asks for a judgment of $500,000 against the defendants as a group, and a judgment against the Texon

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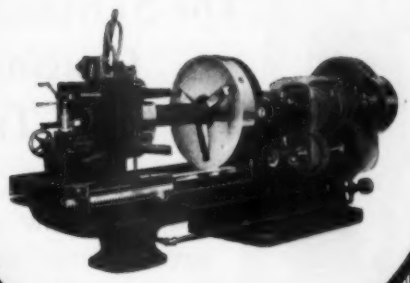

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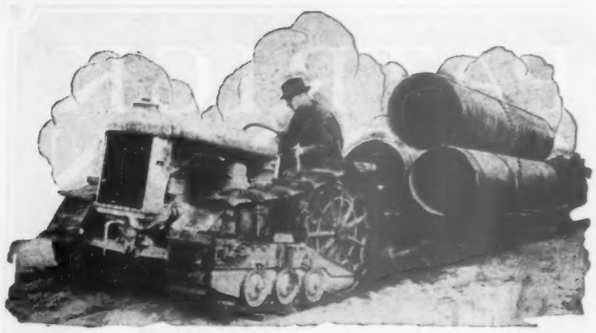

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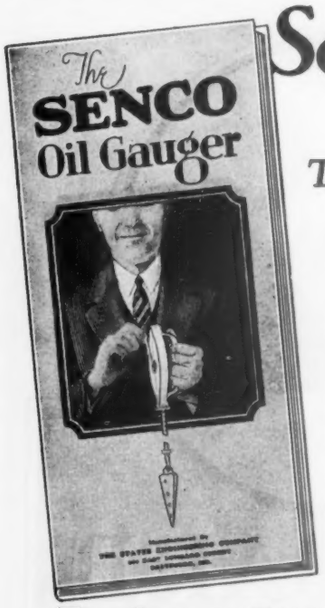

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Oil & Land Co., the Big Lake Oil Co., Group No. 1 Oil Corp., and Group No. 2 Oil Corp., for damages of $2,250,000. It further asks that the permit to do business within the state of the Reagan County Purchasing Co., Inc., be forfeited.

Petition for Receivers

The appointment of receivers to administer the affairs until a final judgment in court, is asked.

An alleged contract between the Texon group and the Marland Oil Co., executed on October 28, 1924, provided for the organization by the latter of the Reagan County Oil Co., with $1,000,000 of common stock, 51 per cent of which and 25,000 shares of preferred stock was delivered to the Marland company for the sum of $500. The remaining 49 per cent of the stock was to be issued to the Texon and the Big Lake companies, in proportion to the amount of oil sold to the Reagan County Oil Co., during the year ending December 1, 1926.

The Regan county company agreed to purchase the oil produced by the two companies on "an average posted price" for the Mid-Continent Field, and then later contracted to deliver the same oil to the Humble Oil & Refining Co. at the same price plus 20 cents per barrel, on a true gravity basis, the petition sets out.

Oil purchased by the Reagan company from the time of its organization until February 28, 1926, amounted to 6,270,368.22 bbls., and 20,000 bbls. have been delivered daily since that time, the petition says. On this oil, the Reagan company received $1,254,073.64 up to February 28. Since that time the company has received approximately $1,250,000 making its total receipts approximately $2,500,000. The petition alleges that the producing companies could sell the oil, if they desired, for the price to which the purchasing company was customarily selling to the Humble company and the Marland company.

Texon Company Receipts

As a result of the operations, the Texon companies will receive under the stock division agreement $1,230,000 from the Reagan Producing company and the Marland Oil Co., $1,280,000, out of the $2,500,000 profit already realized, the petition recites.

A loss of $75,000 to the state is alleged on the loss computations due to dirt and pipeline waste. The producing companies contracted to deliver the oil to the purchasing company allowing a flat 3 per cent deduction for these items, and this oil was resold on a basis of 1 per cent deduction, the petition says. A loss of $100,000 is alleged as the result of sale of oil as of 38 gravity whereas more than 32 per cent is of gravity greater than 38.9.

OIL AND GAS LEASE SALE IN OTOE LANDS

Paying $1,599.23 for an oil lease in the Fannie M. Grant allotment of 158.34 acres in 19-22-1 east, Noble County, Oklahoma, in the Otoe Indian country, the Producers & Refiners Corp., topped all other prices paid during the recent sale of oil and gas leases on Otoe, Ponca and Tonkawa Indian lands. The sales were made through sealed bids, submitted to George Hoye, superintendent of White Eagle Indian agency at Wichita, Kans.

Leases on 34 tracts of Ponca lands, 38 of Otoe and five of Tonkawa were offered for sale, and a total of 37 were sold, including 17 Ponca, 20 Otoe and no Tonkawa. The Prairie Oil & Gas Co. four, Wentz Oil Corp. four, George L. Miller of 101 Ranch two, William H. Vanselous of Big V ranch 14, Andy Krow of Ralston one, C. H. Herillat of Washington, D. C. four, W. R. Laventure of Ponca City two, and Eugene Wetzel of Ponca City four. The Producers & Refiners Corp. bought only the one tract, for which it paid the highest figure of the sale. The Poncas received a total of $2,252.75 and the Otoes $7,380.23 or a grand total of $10,632.98.

The prices paid for the leases ranged all the way from $16.20 to that paid by the Producers & Refiners.

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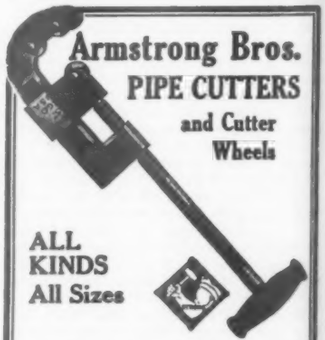

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GASOLINE TAX URGED FOR NEW YORK STATE

NEW YORK, Oct. 2.—A small tax on gasoline apparently is favored in New York State as a means of raising funds for traffic regulation and highway maintenance, but there is a decided difference of opinion as to how the income should be used, it was indicated at a public hearing of the joint legislative Motor Vehicle Committee.

The tax was opposed by representatives of motorists and automobile dealers as an unjust imposition, but was upheld by representatives of the State Tax and Highway Commission, the Farm Bureau Federation and the New York State Grange as a souree of revenue helpful in meeting increased costs of government.

Opponents of the tax based their arguments largely on the ground that the constantly increasing number of motor vehicles will, through existing licens- fees, supply the needed funds, while proponents of the levy pointed to the greater demands for traffic regulation and highway construction and maintenance made yearly and the necessity of obtaining funds to meet such expense.

Mark Graves of the State Tax Commission declared the gasoline tax was a means of raising needed revenue without putting an excessive burden on a few taxpayers. Nearly 2,000,000 motorists in this state, as well as those visiting from other states, would share the expense, he said, while other taxes, which chiefly must affect real estate or personal incomes, would be borne by not more than 700,000 persons.

Arthur Brandt, State Highway Commissioner, declared $36,000,000 will be needed annually for the next five years to maintain the state's highway building program now 2,500 miles behind. The gasoline tax, he said, added to the present license fees, should provide the $20,000,000 needed for reconstruction, the $12,000,000 needed for narrow bridge elimination and the $8,000,000 for general maintenance.

Proposals were also made for changes in existing law. Elimination of chauffeurs' licenses, changing the date of expiration or extending the life of operators' licenses and that of traffic courts in each county, repealing the law limiting legal rate of speed to 30 miles an hour, definition of the term "parking" and giving to motor vehicle inspectors the powers of peace officers were recommended.

The committee adjourned to meet at New York City for a second public hearing October 1.

BRITISH IMPORTS GAIN; CRUDE AND REFINED

By Charles E. Kern

Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Oct. 2.—A marked increase in imports into Great Britain of both crude and refined petroleum has occurred during the first half of 1926, compared with the corresponding period of 1925, according to Consul Robert B. Macatee at London.

In the six months ended with June, gasoline imports amounted to 310,000,000 American gallons, an increase of 49,000,000 gallons over the first six months of 1925; kerosene rose from 81,000,000 to 103,000,000 and lubricating oil from 54,000,00 gallons to almost 57,000,000. Imports of crude oil rose by more than 20,000,000 gallons from 319,600,000 to 339,000,000 gallons. Fuel oil was the only important item showing a decline, dropping from 210,000,000 gallons in the first half of 1925 to 151,174,000 in the first half of this year.

The report says a still more marked increase in both crude and refined petroleum is observed when comparing the imports for June with those of June, 1925, the increase here amounted to more than 34,000,000 American gallons, or 29 per cent in refined products and more than 26,000,000 gallons, or 56 per cent, in crude petroleum. For June, as for the

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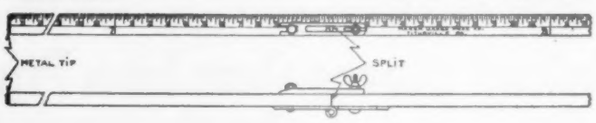

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six-month period, the most pronounced increase was in the gasoline imports.

Mr. Macatee reports exports of refined products in June, 1926, doubled the exports of June of last year, increases being observed in all items except lubricating and gas oil. Exports for the six-months period, on the other hand, decreased from 89,000,000 gallons in the first half of 1925 to 70,000,000 in the first six months of 1926, a decline of 15 per cent. The principal decreases were in fuel oil and gasoline.

LARGEST STEEL TANKS AT WATSON TANK FARM

LOS ANGELES, Calif., Oct. 2.—Associated Oil Co.'s storage farm at Watson, between Los Angeles and the harbor, contains the largest steel storage tanks in the world. In addition to the 55,000 and 80,000-bbl. tanks, there are five tanks of 178,000-bbl. capacity each, which is the world's record for this type of storage.

These tanks are 175 feet 9 inches in diameter and 42 feet in height, the area at the base exceedingly half an acre. The tops are flat, covered with $\frac{5}{8}$-inch steel, depressed 6 inches to form a water seal. Seven hundred and twenty tons of steel were used in the construction of these tanks, as against 300 tons needed in the construction of the 80,000-bbl. tanks.

These huge tanks, designed by the engineering department of the Associated Oil Co., give practically 50 per cent more storage on available area, and, together with the other tanks at this farm, are used for storage of oil from practically every field in southern California.

TRINIDAD PRODUCTION GAINING EVERY YEAR

By Charles E. Kern

WASHINGTON, D. C., Oct. 2.—The petroleum production at Trinidad in 1925 was the largest yet known being 329,895 bbls. in excess of the production for the previous year, states Vice Consul Alfredo El Demorest.

This is the sixth consecutive year which has shown a considerable increase in the output of crude oil. For some time past, owing to conditions on the world market, drilling has been confined almost exclusively to existing fields and practically no new areas have been proved, but toward the close of 1925 it was apparent that activities would soon be extended. At present operations are in progress in a number of new fields.

Crude production for 1925 is recorded as 151,200,000 against 135,000,000 in 1924.

Petroleum exports had the largest value of any Trinidad product exported in 1925, $7,490,779, and represented 33 per cent of the total value of the colony's exports. Ten years ago the petroleum exported amounted to $323,258, and formed less than 3 per cent of the total exports. Most of the petroleum exported is in the form of crude fuel, of which a large part is shipped to the British Admiralty under contract.

The total number of wells drilled up to the end of 1925 was 1,027, of which 658 were on crown lands. In 1925 some 99 new wells were opened up, 62 being on crown lands. The number of companies engaged in oil production in the colony increased from 16 to 19 during the year.

GERMAN GASOLINE PRICES

The price of gasoline in Germany has been forced down to 32 pfennigs a liter, which is about $0.287 a gallon. As the German duty is about $0.05 a gallon and the freight from Belgium is about $0.02, the American companies from their Belgian headquarters can not reckon on much more than $0.217 a gallon, which is very low, according to the Department of Commerce.

To date the synthetic benzine produced by the Badische Anilin & Sodafabrik A. G., Ludwigshafen, has not been marketed at all in this region.

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Look for Illinois P. L. Co. to Take Over Indian P. L. System

By Whit

TOLEDO, Ohio, Oct. 2.—Reports from Owensboro, Ky., is that official announcement is expected within a few days of the transfer of the pipeline properties of the Indian Pipe Line Corp. to the Illinois Pipe Line Co., extending from Bowling Green and Scottsville, Ky., through Owensboro to Lawrenceville, Ill. According to the reports, which are generally credited, the transfer will be effective on and after October 1, 1926.

W. R. Miller, W. F. McCray, John Bretmeier and Charles Bunje of Findlay, Ohio, officials of the Illinois Pipe Line Co., were in Owensboro last Saturday to conclude the final negotiations.

The Indian Pipe Line Corp. is an adjunct of the Indian Refining Co., which has an extensive refining plant at Lawrenceville, Ill. The pipeline from Owensboro was completed about four years ago extending from Owensboro to Lawrenceville. Feeder lines extending from the different producing areas to Haynes Station, on the Illinois Central, whence it was transported by rail to Owensboro and then transferred to the pipeline. A year or more later the line was extended to Bowling Green, Ky., where it was connected with the gathering lines in Warren, Allen and Simpson Counties.

It is understood that the transfer will embrace the main pipeline from Bowling Green to Lawrenceville, including the feeding lines which extend to all the producing fields, but does not include the Indian refinery at Lawrenceville. The transaction runs into millions of dollars.

The Illinois Pipe Line Co. is the transportation end of the Ohio Oil Co., one of the biggest well owner and producers in America and which has been in active operation in the Owensboro Field but a few months. It is not announced whether this means a change in management in the Kentucky end of the line. A. A. Spearin has been the general manager of the Indian Pipe Line Corp. every since its installation.

AUTOMOBILE OUTPUT MAKING NEW RECORD

Automobile production in the United States in August, as reported by the Department of Commerce, was 424,394 vehicles, of which 379,111 were passenger cars and 45,283 were trucks, compared with 355,455 passenger cars and trucks in July and 252,451 in August, 1925, excluding production in Canada, on which figures are not available.

Total production for the first eight months was 2,765,369 passenger cars and 339,383 trucks, compared with 2,529,981 passenger cars and 319,439 trucks in 1925, including Canadian output for all months except August in 1926.

Following table compares monthly United States and Canadian passenger car output:

	1926	1925
January	284,153	213,851
February	325,639	253,955
March	399,376	334,214
April	402,574	393,262
May	394,781	384,548
June	358,365	366,540
July	328,816	360,124
August	379,111	223,517
September		274,227
October		408,017
November		337,435
December		286,141
Total		3,835,801

TEST IN FURNAS COUNTY, NEB.

L. M. Graham writes The Oil and Gas Journal from Beaver City, Neb., that he, together with the Beaver Valley Oil Co., a local concern and F. E. Gilbreath of Luray, Kans., are drilling a test in the NW cor. SW Section 13-2n-22w, Furnas County, 3½ miles east of Beaver City. The test, Mr. Graham writes, is planned for a depth of 3,250 feet, if necessary, and on September 20 it was down 600 feet. He says there was a show of gas at 400 feet. The operators have an 8,000-acre block.

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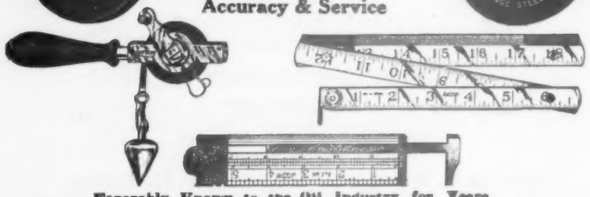

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PIPELINE PIONEERS IN THE TEXAS FIELDS

HOUSTON, Tex., Oct. 2. — William T. Cushing, of this city, is concededly the pioneer pipeline official in Texas in point of service, although only 55 years old. He has retired from pipeline activities to become associated with the Dearborn Chemical Co. as representative in the Southwest.

Mr. Cushing was born near Oil City, Pa.,—Rynd Farm—to be exact, in 1871. He is the son of Thomas Cushing, who in turn was a pioneer pipeline official back in Pennsylvania, with headquarters at Colegrove, as division superintendent of the Pennsylvania Lines.

W. T. Cushing came to Texas in 1897 to act as superintendent of the J. S. Cullinan Pipe Line Co., operating in the Corsicana Field. He remained at Corsicana until the Spindletop Pool opened in 1901, going to that field with Mr. Cullinan. When the latter organized The Texas Company, Mr. Cushing was appointed general superintendent of the pipelines. He remained in that position until 1909, having supervised the construction of pipelines into all the then Coastal pools and the trunk line to Oklahoma. Between 1909 and 1911, he was general superintendent of the Producers Transportation Co., California (Union Oil Co.) laying the first mountain line on the Pacific Coast from the San Joaquin Valley to the Coast. The operation of that line was considered quite an engineering feat in those days, overcoming various temperatures of heated viscous oils in the transportation.

The year 1912 found Mr. Cushing in the new Calgary, Alberta, district, doing contract work with the late Edward Double, organizer of the Union Tool Co.

The next two years Mr. Cushing spent abroad. In 1913-14 he constructed the Government oil lines for the Rumanian Government from Ploeste to Constonga on the Black Sea. The next year he was with the Cowdray and John Hays Hammond interests in Mexico.

Mr. Cushing returned to Texas to become superintendent of the north Texas division of the Humble Pipe Line Co., remaining until 1921 when he was in charge of the Fensland Oil Co. properties in the Breckenridge and west Texas fields.

George H. Speary, of Houston, is another of the early pipeline men, who followed that end of the industry for years and then retired to become a drilling contractor and producer in the Smackover, (Ark.) Field. He recently disposed of his interests there.

Mr. Speary came to Tulsa in 1907 with The Texas Company, and assisted in the construction of the company's Oklahoma trunk line. He came to Houston in the same year as superintendent of the Gulf Coast lines and remained in that capacity until 1920. He was connected with the White Oil Corp. for two years and then engaged in the contracting and producing business. Mr. Speary was born at Marietta, Ohio.

TRINIDAD OIL FIRE FATAL TO H. R. BERRY

NEW YORK, Oct. 2.—Cable advices from Trinidad confirm the report of the death in an oil well fire there of Harry R. Berry, internationally known drilling superintendent.

Mr. Berry was about 38 years old, and is survived by his wife and two daughters, living in Trinidad, and by several brothers in this country. He was from Marietta, Ohio, and was the son of Warren Berry, who was well known in the old Pennsylvania fields as an oil operator. Mr. Berry had spent the last 10 years of his life in foreign oil fields, mostly in the capacity of drilling superintendent. He had served in India, Java, Borneo, Egypt, Venezuela and of late in Trinidad, where he was employed by Petroleum Options, Ltd.

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Link-Belt Co.

Chains—Power Transmission—
Baldwin Chain & Mfg. Co.
Chain Belt Co.
Link-Belt Co.

Chemical Treatment Crude Oil Emulsion—
Barnickel, Wm. S., & Co.

Chlorine—Liquid—
Mathieson Alkali Works, Inc.

Circulating Heads—
Wilson Oil Tools Corp.

Clamps—Anchor—
Bartlesville Supply Co.

Clamps—Belt—
Federal Supply Co.

Clamps—Collar Leak—
Dayton Pipe Coupling Co.
Dresser, S. R., Mfg. Co.

Clamps—Drilling—
Western Supply Co.

Clamps—Hoisting—
Newton Process Mfg. Co.

Clamps—Pipe—
Dayton Pipe Coupling Co.
Dresser, S. R., Mfg. Co.

Clamps—River—
Dresser, S. R., Mfg. Co.
Gaso Pump & Burner Mfg. Co.

Cloths—Wiping—
Nye Tool & Machine Works.

Clutches—Friction, Plate Type—
Twin Disc Clutch Co.

Cocks—Brass & Iron—
Lunkenheimer Co.
Walworth Co.

Cocks—Plug—
Homestead Valve Mfg. Co.

Cocks—Plug, Acid Proof—
Duriron Co.

Cocks—Water Gauge—
Shaffer, J. E., Co.
Smith Separator Co.

Coils and Bends—Pipe—
Harrisburg Pipe & Pipe Bending Co.
Midwest Pipe & Supply Co.

Compounds—Boiler—
Dearborn Chemical Co.

Compounds—Cement, Quick Setting—
Master Builders Co.
Sullivan Co.

Compounds—Joint Sealing—
Key Boiler Equipment Co.

Compounds—Oil Well Cleaning—
Sullivan Co.

Compressed Air Process—
Air Cleaning & Reaming Corp.

Compressor Cylinders (See Cylinders—Compressor)—

Compressors—Air—
Bessemer Gas Engine Co.
Clark Brothers Co.
Cooper, C. & G., Co.
Gardner Governor Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.

Compressors—Ammonia—
Carbondale Machine Co.
Cooper, C. & G., Co.

Compressors—Direct Connected Motor and Gas Engine Driven
Buffalo Gasolene Motor Co.
Clark Brothers Co.
Cooper, C. & G., Co.
Miller Improved Gas Engine Co.

Compressors—Direct Driven Air and Gas—
Bessemer Gas Engine Co.
Miller Improved Gas Engine Co.

Compressors—Gas—
Bessemer Gas Engine Co.
Chicago Pneumatic Tool Co.
Clark Brothers Co.
Cooper, C. & G., Co.
Hope Engineering & Supply Co.
Ingersoll-Rand Co.
National Transit Pump & Machine Co.
Worthington Pump & Machinery Corp.

Compressors—Oil—Coke—
Porter & Company.

Concrete-Hardener and Waterproofer—
Master Builders Co.

Condenser Boxes—
Kaw Steel Construction Co.
Petroleum Iron Works Co.

Condensers—
American Radiator Co.
Chicago Pneumatic Tool Co.
National Gas Products Co.
Ross Heater & Mfg. Co.
Southwestern Engineering Co., Inc.
Southwestern Engineering Corp.

Controllers—Automatic—
Brown Instrument Co.

Controllers—Liquid Level—
Fisher Governor Co., Inc.
Newton Process Mfg. Co.
Smith Separator Co.

Controllers—Pressure—
Smith Separator Co.

Controllers—Temperature—
Foxboro Co., Inc.

Conveying & Elevating Machinery
Brady Conveyors Corp.

Conveyors—Bucket and Belt—
Brady Conveyors Corp.

Conveyors—Pneumatic—
Brady Conveyors Corp.

Conveyors—Portable Belt—
Barber-Greene Co.

Cooling Towers—Atmospheric—
Braun, C. F., & Co.
National Gas Products Co.

Cordage—
Bridgeport Machine Co.
International Supply Co.
Plymouth Cordage Co.

Core Drilling—
Longyear, E. J., Co.

Core Drills—
Elliott Core Drilling Co.

Core Drills—Diamond—
Longyear, E. J., Co.
Sullivan Machinery Co.

Core Drills—Diamonds For—(See Diamonds for Core Drilling)—

Coring Tools—
Reed Roller Bit Co.
Wilson Oil Tools Corp.

Couplings—Flexible—
Nuttall, R. D., & Co.
Victaulic Co. of America.

Couplings—Plain End Pipe—
Dayton Pipe Coupling Co.
Dresser, R. S., Mfg. Co.

Couplings—Seamless Steel—
Harrisburg Pipe & Pipe Bending Co.
Superior Tube Co.

Couplings—Steel for Casing, Line Pipe, Drill Pipe and Tubing—
Dayton Pipe Coupling Co.
Smith, A. O., Corp.

Cracking Processes—
Graver Corp.
Kellogg, M. W., Co.
Universal Oil Products Co.

Crawler Treads—
Belle City Mfg. Co.
Full Crawler Co.

Crown Blocks—
International Derrick & Equipment Co.
Lucey Mfg. Corp.
Moore, Lee C., & Co., Inc.
Parkersburg Rig & Reel Co.

Cups—Composition—
Williamsport Development Co.

Cups—Leather—
Auer, C. A.

Cutters—Pipe—
Borden Co.
Nye Tool & Machine Works.
Trimont Mfg. Co.

Cylinders—Compressor—
Hope Engineering & Supply Co.

Cylinder Stocks—
Barnsdall Refining Co.
Pure Oil Co.
Texas Company, The.

D

Dehydrating Process—
Barnickel, Wm. S., Co.

Dephlegmators—
Graver Corp.
National Gas Products Co.
Newton Process Mfg. Co.
Smith, A. O., Corp.

Depletion Reports—
American Appraisal Co.

Derricks—Steel—
Emsco Derrick & Equip. Co.
International Derrick & Equipment Co.
Marion Mch., Fdy. & Supply Co.
Moore, Lee C., & Co., Inc.
O'Brien Steel Construction Co.
Parkersburg Rig & Reel Co.
Superior Tube Co.

Derricks—Turnbuckle—
National Turnbuckle Derrick Co.

Diamonds—For Core Drilling—
Patrick, R. S.

Die Heads—Automatic Screw Cutting—
Landis Machine Co.

Die Heads—Bolt Threading—
Bignall & Keeler Mch. Works.
Landis Machine Co.

Die Heads—Stationary Pipe Threading—
Bignall & Keeler Mch. Works.
Cox & Sons Co., The.
Landis Machine Co.

Diesel Engines (See Engines)—

Dies—Pipe Threading—
Bignall & Keeler Mch. Works.
Cox & Sons Co., The.
Landis Machine Co.
Nye Tool & Machine Works.

Direct Driven Pumps (See Pumps)

Disc Bits (See Bits—Disc)—

Ditchers—Pipe Line—
Barber-Greene Co.
Buckeye Traction Ditcher Co.

Draw Works—
Lucey Mfg. Corp.
National Supply Co.
Titusville Iron Works Co.

Drillers Hose (See Hose)—

Drilling & Fishing Tools—
Acme Fishing Tool Co.
Baash-Ross Tool Co.
Bovaird & Seyfang Mfg. Co.
Bovaird Supply Co.
Bridgeport Machine Co.
Brown Tool Co., Inc.
Burns Tool Co.
Continental Supply Co.
Cushing, Tim, Tool & Supply Co.
Emsco Derrick & Equip. Co.
General Oil Tools Co.
Hinderliter Tool Co.
Hughes Tool Co.
International Supply Co.
Larkin & Co.
Leidecker Tool Co.
Lucey Mfg. Corp.
Murray Tool & Supply Co.
Oil Well Supply Co.
Reed Roller Bit Co.
Regan Forge & Engineering Co.
Spang & Co.
Star Drilling Machine Co.
U. S. Tool Co.

Drilling Engines—(See Engines)—

Drilling Equipment—
Clark Brothers Co.
Hughes Tool Co.
O'Brien Steel Construction Co.
Oil Well Supply Co.
Parkersburg Rig & Reel Co.
Reed Roller Bit Co.
Star Drilling Machine Co.

Drilling Machines—
Leidecker Tool Co.
Oil Well Supply Co.
Star Drilling Machine Co.

Drilling Tools—(See Drilling and Fishing Tools)—

Drills—Portable Air—
Chicago Pneumatic Tool Co.

Drive Shoes—
Bartlesville Supply Co.
Larkin & Co.

Drops and Seats—
Norris Brothers, Inc.

Drums (See Barrels)—

Dynamos—
Westinghouse Electric & Mfg. Co.

E

Ejectors—
Penberthy Injector Co.

Electrical Equipment—
Fairbanks-Morse & Co.
Pyle National Co.
Wico Electric Co.

Electric Drilling Equipment—
Lucey Mfg. Corp.
Westinghouse Electric & Mfg. Co.

Electric Steel Castings (See Castings—Electric—Steel)—

Elevators—Casing and Tubing—
Bovaird Supply Co.
Bridgeport Machine Co.
Dunn Mfg. Co.
Lucey Mfg. Corp.
Oil Well Supply Co.
Wilson Oil Tools Corp.

Elevators—Rod—
R. & A. Specialty Co.
D. & B. Pump & Supply Co.
Dunn Mfg. Co.

Enamels—
Arco Company, The.
Detroit Graphite Co.
Sherwin-Williams Co.

Engineers—Consulting and Contracting—
Brooks Engineering Corp.
Hope Engineering & Supply Co.
Kellogg, M. W., Co.
McKee, Arthur G., & Co.
National Petroleum Engineering Corp.
Power Specialty Co.
Westcott & Greis.
Widdell Engineering Co.

Engineers—Fire Protection—
Brooks Engineering Corp.
Foamite-Childs Corp.

Engineers—Oil Buildings—
Austin Co.
International Derrick & Equipment Co.

Engineers—Oil Mining—
Ranney Oil Mining Co.

Engineers—Oil Treating—
Barnickel, Wm. S., & Co.
National Gas Products Co.

Engines—Crude Oil—
Continental Supply Co.
Western Machinery Co.

Engines—Diesel—
Bessemer Gas Engine Co.
Busch-Sulzer Bros. Diesel Engine Co.
Foos Gas Engine Co.
McIntosh & Seymour Corp.
Western Machinery Co.
Worthington Pump & Machinery Corp.

Engines—Drilling—
Ajax Iron Works.
Bessemer Gas Engine Co.
Bovaird & Seyfang Mfg. Co.
Brownell Co., The.
Buda Co.
Buffalo Gasolene Motor Co.
Clark Bros. Co.
Climax Engineering Co.
Franklin Valveless Engine Co.
Hercules Motor Corp.
Pattin Bros. Co.
Power Mfg. Co.
Republic Supply Co.
Titusville Iron Works Co.

Engines—Gas—
Bessemer Gas Engine Co.
Buda Co.
Buffalo Gasolene Motor Co.
Chicago Pneumatic Tool Co.
Clark Brothers Co.
Climax Engineering Co.
Continental Supply Co.
Cooper, C. & G., Co.
Emsco Derrick & Equip. Co.
Foos Gas Engine Co.
Franklin Valveless Engine Co.
Frick-Reid Supply Co.
Hope Engineering & Supply Co.
Ingersoll-Rand Co.
International Supply Co.
Jones, S. M., Co.
Marion Mch., Fdy. & Supply Co.
Miller Improved Gas Engine Co.
National Supply Co.
National Transit Pump & Machine Co.
Oil Well Supply Co.
Pattin Bros. Co.
Reid, Joseph, Gas Engine Co.
Titusville Iron Works Co.
Waukesha Motor Co.
Western Machinery Co.

Engines—Gasoline—
Buda Co.
Buffalo Gasolene Motor Co.
Climax Engineering Co.
Continental Motors Corp.
Fairbanks-Morse & Co.
Hercules Motor Corp.
International Harvester Co. of America.
Waukesha Motor Co.
Western Machinery Co.

Engines—Oil—
Bessemer Gas Engine Co.
De La Vergne Machine Co.
Fairbanks-Morse & Co.
Franklin Valveless Engine Co.
Ingersoll-Rand Co.
International Harvester Co. of America.
McIntosh & Seymour Corp.
National Supply Co.
Oil Well Supply Co.
Power Mfg. Co.
Reid, Joseph, Gas Engine Co.
Western Machinery Co.

Engines—Semi-Diesel, Oil—
Chicago Pneumatic Tool Co.

Engines—Steam—
Ajax Iron Works.
Frick-Reid Supply Co.
Lucey Mfg. Corp.
National Supply Co.
Oil Well Supply Co.

Evaporators—
Newton Process Mfg. Co.
Ross Heater & Mfg. Co., Inc.

F

Fabricators for Gasoline Plants and Refineries—
National Gas Products Co.
Stearns-Roger Mfg. Co.

Filters—Oil—
Hurt Mfg. Co.

Fire Extinguishers—
Foamite-Childs Corp.

Fire Extinguishers — Recharge Service—
Foamite-Childs Corp.

Fishing Tools (See Drilling and Fishing Tools)—

Fittings—Dropped Forged Steel—
Vogt, Henry, Machine Co.

Fittings—Forged Steel—
Central Forging Co.

Fittings—Malleable & Cast Iron—
Bovaird Supply Co.
Crane Co.
Frick-Reid Supply Co.
Walworth Co.

Fittings—Pipe—
Dayton Pipe Coupling Co.
Dresser, S. R., Mfg. Co.
Gaso Pump & Burner Mfg. Co.
Jarecki Mfg. Co.
Kellogg, M. W., Co.
Kennedy Valve Mfg. Co.
Metric Metal Works.
Oil Well Supply Co.
Reading Steel Casting Co.
Republic Supply Co.
United Iron Works, Inc.
Victaulic Co. of America.
Walworth Co.

Fittings—Pipe Acid Proof—
Duriron Company.

Fittings—Steel—
Dayton Pipe Coupling Co.
Kerotest Mfg. Co.
Ohio Steel Foundry Co.
Walworth Co.

Flanges—Brass, Iron and Steel—
Jefferson Union Co.
Metric Metal Works.
Walworth Co.

Flange Unions—
Dart, E. M., Mfg. Co.
Gaso Pump & Burner Mfg. Co.

Flashlights—
National Carbon Co.

Floating Roofs and Decks—
Chicago Bridge & Iron Works.

Floodlights—
Pyle-National Co.

Forging Billets—
Andrews Steel Co.
Harrisburg Pipe & Pipe Bending Co.
Heppenstall Forge & Knife Co.

Forgings—
Champion Machine & Forging Co.

Fuel Oil (See Oil—Fuel)—

Fullers Earth—
Sinclair Refining Co.

G

Gas Holders—
Chicago Bridge & Iron Works.

Gaskets—
McCord Radiator & Mfg. Co.

Gaskets—Fibre—
Durabla Mfg. Co.
Garlock Packing Co.

Gas Masks & Safety Appliances—
Mine Safety Appliance Co.

Gasoline—
Crown Central Petroleum Co.
Empire Refineries, Inc.
Gulf Refining Co.
Magnolia Petroleum Co.
Pure Oil Co.
Sinclair Refining Co.
Skelly Oil Co.

Gasoline—Natural—
Chestnut & Smith Corp.
National Gas Products Co.
Skelly Oil Co.
Warren Petroleum Co.

Gasoline Plant Equipment—
Bessemer Gas Engine Co.
Clark Brothers Co.
Kellogg, M. W., Co.
McKee, Arthur G., & Co.
National Gas Products Co.
Newton Process Mfg. Co.
Ross Heater & Mfg. Co., Inc.
Widdell Engineering Co.

Gas Regulating Casinghead—
Davis, G. M., Regulator Co.
National Gas Products Co.

Gas Scrubbers—
National Gas Products Co.
Newton Process Mfg. Co.

Gauge Glass—High Pressure—
Durabla Mfg. Co.

Gauge Poles—
Marsh Gauge Pole Co.
Missouri Woodworking Co.

Gauges—Automatic Tank—
Brooks Engineering Co.

Gauges—Draft—
Brown Instrument Co.

Gauges—Oil—
Penberthy Injector Co.

Gauges—Pressure and Vacuum—
Bristol Co.
Brown Instrument Co.
Equitable Meter & Mfg. Co.
Metric Metal Works.

Gauges—Test—
Equitable Meter & Mfg. Co.
Metric Metal Works.

Gear Driven Pumps (See Pumps)

Gears—Cut—
Nuttall, R. D., & Co.

Gears—Reduction—
Emsco Derrick & Equip. Co.
Nuttall, R. D., & Co.

Gears—Reverse—
Emsco Derrick & Equip. Co.

Generators—
Westinghouse Electric & Mfg. Co.

Generators—Acetylene—
Carbic Mfg. Co.
Oxweld Acetylene Co.

Generators—Turbine—
Moon Manufacturing Co.
Pyle-National Co.
Westinghouse Electric & Mfg. Co.

Glassware—Chemical for Laboratory Use—
Illinois Glass Co.

Governors—
Equitable Meter & Mfg. Co.
Gardner Governor Co.

Governors—Boiler Feed—
Chaplin-Fulton Mfg. Co.
Fisher Governor Co.

Grating—Steel—
Blaw-Knox Co.

Grey Iron Castings (See Castings)

H

Hammers—Chipping and Calking Pneumatic—
Chicago Pneumatic Tool Co.

Hammers—Riveting Pneumatic—
Chicago Pneumatic Tool Co.

Hangers—Iron and Steel—
Continental Supply Co.
Dodge Mfg. Corp.

Hangers—Tubing—
Hercules Tool Co.

Hatches—Gauges and Thief—
Oil Conservation Engineering Co.

Heat Exchangers—
Carbondale Machine Co.
Griscom-Russell Co.
Hope Engineering & Supply Co.
National Gas Products Co.
Newton Process Mfg. Co.
Ross Heater & Mfg. Co.
Southwestern Engineering Co., Inc.
Southwestern Engineering Corp.

Heat Interchangers—Fluid—
Braun, C. F., & Co.
Ross Heater & Mfg. Co., Inc.

Hoists—Pneumatic, Geared and Universal—
Chisholm-Moore Mfg. Co.
Yale & Towne Mfg. Co.

Hoists—Portable—
Chisholm-Moore Mfg. Co.
Ford Chain Block Co.
Sullivan Machinery Co.
Wright Mfg. Co.
Yale & Towne Mfg. Co.

Hooks for Rods and Tubing—
B. & A. Specialty Co.
Dunn Mfg. Co.

Hose—
Fenwick-Reddaway Mfg. Co.

Hose—Drillers—
Goodrich, B. F., Rubber Co.
United States Rubber Co.

Hose—Oil Suction and Discharge
Goodrich, B. F., Rubber Co.
United States Rubber Co.

Hose—Rubber—
Goodyear Tire & Rubber Co.
United States Rubber Co.

Hypochlorite of Lime—
Mathieson Alkali Works, Inc.

I

Injectors—
Penberthy Injector Co.

Inspectors—Pipe—
Hunt, Robert W., Co.

Insulation Materials—
General Insulating & Mfg. Co.
Johns-Manville, Inc.

Insurance—Fire—
Oil Insurance Association.

Insurance—Tornado—
Oil Insurance Association.

Iron—Ingot—
American Rolling Mill Co.

J

Jacks—Hydraulic—
Bridgeport Machine Co.

Jacks—Lifting—
Templeton, Kenly & Co., Ltd.

Jacks—Pumping—
American Mfg. Co. of Texas.
American Wells Works.
Bessemer Gas Engine Co.
Braden Co.
Frick-Reid Supply Co.
Jones, S. M., Co.
Kansas City Hay Press Co.
Norris, W. C.
Spang & Co.

Jars—
Arbon, Paul, & Co.
Bridgeport Machine Co.
Spang & Co.

Jar Steel—
Andrews Steel Co.
Heppenstall Forge & Knife Co.

K

Kerosene—
Empire Refineries, Inc.
Gulf Refining Co.
Magnolia Petroleum Co.
Pure Oil Co.

L

Lacquers—
Arco Company, The.
Sherwin-Williams Co.

Lanterns—Electric—
Delta Electric Co.

Lead and Mixed Metal Products—
Eagle-Picher Lead Co.
National Lead Co.

Lead in Oil—
Eagle-Picher Lead Co.
National Lead Co.

Lead Wool and Containers—
Eagle-Picher Lead Co.

Lighting Equipment—
Pyle-National Co.
Westinghouse Electric & Mfg. Co.

Litharge—
Eagle-Picher Lead Co.
National Lead Co.

Loaders—Trucks—
Barber-Greene Co.

Long Distance Telephone—
American Telephone & Telegraph Co.

Lubricating Devices—
McCord Radiator & Mfg. Co.

Lubricators—
Ajax Iron Works.
Lunkenheimer Co.

Lubricators—Force Feed—
Hills-McCanna Co.
McCord Radiator & Mfg. Co.
Manzel Brothers Co.

M

Machine Tools—
Ryerson, Jos. T., & Sons, Inc.

Manholes—Tank—
Brooks Engineering Corp.

Manifolds—
Reid, Joseph, Gas Engine Co.

Meters—Gas—
Equitable Meter & Mfg. Co.
Foxboro Co., Inc.
Metric Metal Works.
Pittsburgh Meter Co.
Roots, P. H. & F. M., Co.
Westcott & Greis.

Meters—Electric—
Brown Instrument Co.

Meters—Gasoline—
Pittsburgh Meter Co.

Meters—Oil—
Pittsburgh Meter Co.

Molded Goods—Rubber—
Garlock Packing Co.
Goodyear Tire & Rubber Co.

Motors—Electric—
Fairbanks-Morse & Co.
Westinghouse Electric & Mfg. Co.

Motors—Gasoline (See Engines—Gasoline)—

N

Naphtha—
Pure Oil Co.

Natural Gasoline (See Gasoline—Natural)—

Natural Gasoline Plant Equipment—
Campbell, J. A.
Cooper, C. & G., Co.
Griscom-Russell Co.
National Gas Products Co.
Roots, P. H. & F. M., Co.
Ross Heater & Mfg. Co., Inc.
Smith Separator Co.
Westcott & Greis.

Nitrogen—
Linde Air Products Co.

Nozzles—Spray—
Power Plant Equipment Co.

O

Oil and Gas Pipe Line Construction—
Hope Engineering & Supply Co.

Oil Burners (See Burners—Oil)—

Oil Field Equipment—
Baker Casing Shoe Co.
Bridgeport Machine Co.
Gaso Pump & Burner Mfg. Co.
International Derrick & Equipment Co.
Iron King Mfg. Co.
Kaw Steel Construction Co.
National Supply Co.
Oil Well Supply Co.
Parkersburg Rig & Reel Co.
Reed Roller Bit Co.
Regan Forge & Engineering Co.
Reid, Joseph, Gas Engine Co.
Republic Supply Co.
Simplex Equipment Co.
Trumble Gas Trap Co.

Oil—Fuel—
Crown Central Petroleum Corp.
Empire Refineries, Inc.
Gulf Refining Co.
Magnolia Petroleum Co.
Pure Oil Co.
Sinclair Refining Co.
Texas Company, The.

Oil—Gas—
Crown Central Petroleum Corp.
Gulf Refining Co.
Pure Oil Co.
Sinclair Refining Co.
Texas Company, The.

Oil—Lubricating—
Barnsdall Refining Co.
Crown Central Petroleum Corp.
Empire Refineries, Inc.
Gulf Refining Co.
Humble Oil & Refining Co.
Magnolia Petroleum Co.
Pure Oil Co.
Sinclair Refining Co.
Skelly Oil Co.
Texas Company, The.

Oil—Tractor—
Barnsdall Refining Co.
Gulf Refining Co.
Pure Oil Co.
Skelly Oil Co.

Oiling Devices—
Lunkenheimer Co.

Oil Meters (See Meters)—

Oil Piping Equipment (See Fittings)—

Oil Reclaiming Process—
Barnickel, Wm. S., & Co.

Oil Well Cementing—
Halliburton Oil Well Cementing Co.

Oil Well Tools—
D. & B. Pump & Supply Co.
Hinderliter Tool Co.
Reed Roller Bit Co.
Titusville Forge Co.
U. S. Tool Co.

Over Shots—
Reed Roller Bit Co.
Regan Forge & Engineering Co.

Oxygen—
Linde Air Products Co.

P

Packer Release—
Acme Fishing Tool Co.

Packers—
Goodyear Tire & Rubber Co.
Guiberson Corp.
Larkin & Co.
Layne & Bowler Co.
Meier, E. C., Lubricating Co.
Oil Well Supply Co.
Regan Forge & Engineering Co.
Spang & Co.
United States Rubber Co.

Packing—
Crane Packing Co.
Durabla Mfg. Co.
Goodrich, B. F., Rubber Co.
Imperial Belting Co.
Johns-Manville, Inc.

Packing—Metallic—
Crane Packing Co.
Garlock Packing Co.

Paints—
Aluminum Co. of America.
American Asphalt Paint Co.
Arco Company, The.
Detroit Graphite Co.
Dixon, Joseph, Crucible Co.
Du Pont de Nemours, E. I. & Co., Inc.
Eagle-Picher Lead Co.
Eclipse Paint & Mfg. Co.
Hill, Hubbell & Co.
National Lead Co.
Sherwin-Williams Co.
St. Louis Surfacer & Paint Co.

Pipe—Cast Iron—
Greenspon's Jos., Sons Iron & Steel Co.
International Supply Co.
U. S. Cast Iron Pipe & Fdy. Co.

Pipe—Lead Chemical and Antimonial—
Eagle-Picher Lead Co.
National Lead Co.

Pipe—Steel—
Central Tube Co.
Continental Supply Co.
Greenspon's Jos., Sons Iron & Steel Co.
Jarecki Mfg. Co.
Kellogg, M. W., Co.
Murray Tool & Supply Co.
National Supply Co.
National Tube Co.
Republic Iron & Steel Co.
Ryerson, Jos. T., & Sons, Inc.
South Chester Tube Co.
Spang, Chalfant & Co., Inc.
Superior Tube Co.
Taubman Supply Corp.
Wheeling Steel Corp.

Pipe—Wrought Iron—
Byers, A. M., Co.
Frick-Reid Supply Co.
Greenspon's, Jos., Sons Iron & Steel Co.
Oil Well Supply Co.
Reading Iron Co.
South Chester Tube Co.
Superior Tube Co.
Taubman Supply Corp.

Pipe and Nipple Threading Machines—
Bignall & Keeler Mch. Works
Cox & Sons Co., The.
Landis Machine Co.
Ryerson, Jos. T., & Sons, Inc.
Standard Engineering Co.

Pipe Clamps (See Clamps—Pipe)

Pipe Grips—
Larkin & Co.

Pipe Headers—
National Tube Co.
Newton Process Mfg. Co.

Pipe Line Coatings—
Hill, Hubbell & Co.

Pipe Line Construction Tools—
National Transit Pump & Machine Co.

Pipe Line Equipment—
Gaso Pump & Burner Mfg. Co.

Pipe Screwing Machines—
Buckeye Traction Ditcher Co.

Pipe Straightening Machines—
W-K-M Co., Inc.

Pipe Suspension Device—
Stearns-Roger Mfg. Co.

Pipe Threaders—Power—
Williams Tool Corp.

Pipe Tools—
Armstrong Brothers Tool Co.
Nye Tool & Machine Works
Ridge Tool Co.
Walworth Co.

Piping—Fabricated—
Midwest Piping & Supply Co.

Piping—Hard Rubber—
United States Rubber Co.

Piping—Steel & Iron—
Crane Co.
Greenspon's, Jos., Sons Iron & Steel Co.
Power Piping Co.

Pistons—
Guiberson Corp.
Hepenstall Forge & Knife Co.

Pistons—Expansion—
Wilson Oil Tools Corp.

Pistons—Sulsh Pump—
Guiberson Corp.

Plugs—Bottom Water—
Guiberson Corp.

Pre-Heaters—
National Gas Products Co.
Newton Process Mfg. Co.
Ross Heater & Mfg. Co., Inc.

Preservatives—Asphalt—
American Asphalt Paint Co.

Pulleys—Wood, Iron and Steel—
Continental Supply Co.
Dodge Mfg. Co.

Pulling Machines—
Iron King Mfg. Co.
National Supply Co.
Safety Pulling Machine Co.

Pumpers—Long Stroke—
Farley Machine Co.

Pumping and Pulling Meters—Electric—
Westinghouse Electric & Mfg. Co.

Pumping Equipment—
American Well Works.
Axelson Machine Co.
Byron Jackson Pump Mfg. Co. Inc.
D. & B. Pump & Supply Co.
Farley Machine Co.
Gouids Pumps, Inc.
Jones, S. M., Co.
Myers, F. E., & Bros., Co.
Northrup Equipment Co.
Oil Well Supply Co.
Prescott Co.
Ratigan, J. P., Co.
Waukesha Motor Co.

Pumping Gear Units—
Nuttall, R. D., & Co.

Pumping Powers—
Bessemer Gas Engine Co.
Buda Co.
Frick-Reid Supply Co.
Jones, S. M., Co.
Kansas City Hay Press Co.
Marion Mch., Fdy. & Supply Co.
National Supply Co.
Oil Well Supply Co.
Pattin Bros. Co.
Reid, Joseph, Gas Engine Co.
Spence Machine Co.
Titusville Iron Works Co.

Pumps—Acid Proof—
Duriron Company.

Pumps—Boiler Feed—
Axaj Iron Works.
Byron Jackson Pump Mfg. Co. Inc.
Fairbanks-Morse & Co.
Gardner Governor Co.
Gouids Pumps, Inc.
Oil Well Supply Co.
Smith Separator Co.

Pumps—Centrifugal—
American Well Works.
Byron Jackson Pump Mfg. Co. Inc.
Fairbanks-Morse & Co.
Gouids Pumps, Inc.
Smith Separator Co.
Worthington Pump & Machinery Corp.

Pumps—Direct Driven—
Bessemer Gas Engine Co.
Smith Separator Co.

Pumps—Electric—
Prescott Co.
Smith Separator Co.

Pumps—Fuel Oil Service—
Blackmer Pump Co.
Gouids Pumps, Inc.
Northern Fire Apparatus Co.
Smith Separator Co.

Pumps—Fuel Oil Transfer—
Blackmer Pump Co.
Byron Jackson Pump Mfg. Co. Inc.

Pumps—Gasoline and Oil for Filling Stations—
Gilbert & Barker Mfg. Co.

Pumps—Gear Driven—
Gaso Pump & Burner Mfg. Co.
Lucey Mfg. Corp.
Prescott Co.
Smith Separator Co.

Pumps—Hot Oil—
Blackmer Pump Co.
Byron Jackson Pump Mfg. Co., Inc.
Goulds Pumps, Inc.
Smith Separator Co.

Pumps—Pipe Line—
Byron Jackson Pump Mfg. Co., Inc.
Frick-Reid Supply Co.
Gardner Governor Co.
Gaso Pump & Burner Mfg. Co.
Goulds Pumps, Inc.
National Transit Pump & Machine Co.
Prescott Co.
Worthington Pump & Machinery Corp.

Pumps—Portable—
Gaso Pump & Burner Mfg. Co.

Pumps—Power—
Fairbanks-Morse & Co.
Gardner Governor Co.
Gaso Pump & Burner Mfg. Co.
Goulds Pumps, Inc.
Myers, F. E., Bro. & Co.
National Transit Pump & Machine Co.
Prescott Co.
Smith Separator Co.
Waukesha Motor Co.

Pumps—Refinery—
Blackmer Pump Co.
Byron Jackson Pump Mfg. Co., Inc.
Gardner Governor Co.
Gaso Pump & Burner Mfg. Co.
Goulds Pumps, Inc.
National Transit Pump & Machine Co.
Northern Fire Apparatus Co.
Smith Separator Co.

Pumps—Rotary—
Blackmer Pump Co.
Goulds Pumps, Inc.
Northern Fire Apparatus Co.
Roots, P. H. & F. M., Co.

Pumps—Sand—
Bridgeport Machine Co.
Larkin & Co.
Smith Separator Co.

Pumps—Slush—
Gardner Governor Co.

Pumps—Steam—
Fairbanks-Morse & Co.
Frick-Reid Supply Co.
Gardner Governor Co.
Gaso Pump & Burner Mfg. Co.
Lucey Mfg. Corp.
National Transit Pump & Machine Co.
Oil Well Supply Co.
Prescott Co.
Smith Separator Co.

Pumps—Suction—
Gaso Pump & Burner Mfg. Co.

Pumps—Vacuum—
Bessemer Gas Engine Co.
Chicago Pneumatic Tool Co.
Clark Brothers Co.
Gaso Pump & Burner Mfg. Co.
Miller Improved Gas Engine Co.
Roots, P. H. & F. M., Co.
Ross Heater & Mfg. Co., Inc.
Smith Separator Co.

Pumps—Water—
American Well Works.
Byron Jackson Pump Mfg. Co., Inc.
Gaso Pump & Burner Mfg. Co.
Goulds Pumps, Inc.
Northern Fire Apparatus Co.
Prescott Co.
Smith Separator Co.

Pyrometers—
Brown Instrument Co.
Republic Flow Meters Co.

R

Ratchet Pipe Cutters—
Toledo Pipe Threading Machine Co.

Ratchet Pipe Threaders—
Nye Tool & Machine Works.
Toledo Pipe Threading Machine Co.

Ratchet Reamers—
Nye Tool & Machine Works.

Ratchet Stocks and Dies—
Nye Tool & Machine Works.
Toledo Pipe Threading Machine Co.

Receiving Boxes—
Reid, Joseph, Gas Engine Co.

Recorders—Differential Pressure—
Equitable Meter & Mfg. Co.
Metric Metal Works.

Refinery Equipment—
American Radiator Co.
Blaw-Knox Co.
Braun, C. F., & Co.
Carbondale Machine Co.
Chicago Bridge & Iron Works.
Graver Corp.
Griscom-Russell Co.
Kellogg, M. W., Co.
McKee, Arthur G., & Co.
Newton Process Mfg. Co.
Petroleum Appliance Co.
Petroleum Iron Works Co.
Power Piping Co.
Power Specialty Co.
Reid, Joseph, Gas Engine Co.
Ross Heater & Mfg. Co., Inc.
Ross-Meehan Foundries.
Smith, A. O., Corp.
Smith Separator Co.
Southwestern Engineering Co., Inc.
Southwestern Engineering Corp.
United Iron Works, Inc.
Universal Oil Products Co.
Vogt, Henry, Machine Co.
Walsh & Weidner Boiler Co.
Westcott & Greis.
Widdell Engineering Co.

Refractories—Furnace, Stills and Baffles—
National Gas Products Co.

Refrigerating Machinery—
Carbondale Machine Co.
United Iron Works, Inc.
Vogt, Henry, Machine Co.

Regulators—
Fisher Governor Co.
Gilfillan Machine Works.
Smith Separator Co.

Regulators—Gas—
Chaplin-Fulton Mfg. Co.
Davis, G. M., Regulator Co.
Equitable Meter & Mfg. Co.
Fisher Governor Co.
Metric Metal Works.
National Gas Products Co.
Smith Separator Co.

Rental Service—
Bridgeport Machine Co.

Reversible Clutches—
Bessemer Gas Engine Co.

Rig Irons—
International Supply Co.
Lucey Mfg. Corp.
National Supply Co.
Oil Well Supply Co.
Parkersburg Rig & Reel Co.

Rigs—Drilling, All Steel—
International Derrick & Equipment Co.
Moore, Lee C., & Co., Inc.

Rigs—Portable Drilling—
National Supply Co.
National Turnbuckle Derrick Co.
Star Drilling Machine Co.

Rod Guides—
Meier, E. C., Lubricating Co.

Rods—Gauge—
Missouri Woodworking Co.

Rods—Polish—
Jones, S. M., Co.

Rods—Pull—
Axelson Machine Co.
Columbus Sucker Rod Co.
Jones, S. M., Co.
Sheffield Steel Corp.

Rods—Sucker—
Axelson Machine Co.
Columbus Sucker Rod Co.
D. & B. Pump & Supply Co.
Frick-Reid Supply Co.
Jones, S. M., Co.
National Supply Co.
Oil Well Supply Co.
Republic Supply Co.
Sheffield Steel Corp.

Rods—Valve—
Jones, S. M., Co.

Roofing—Asbestos—
Johns-Manville, Inc.

Roofing—Galvanized Iron—
American Rolling Mill Co.

Rope Socket Metal—
Eagle-Picher Lead Co.

Rope—Manila—
Ajax Rope Co., Inc.
Bovaird Supply Co.
Republic Supply Co.

Rope—Wire—
Ajax Rope Co., Inc.
Bovaird Supply Co.
Bridgeport Machine Co.
Broderick & Bascom Rope Co.
International Supply Co.
Jarecki Mfg. Co.
Wickwire-Spencer Steel Corp.
Leschen, A., & Sons Rope Co.
Williamsport Wire Rope Co.

Rotary Bit Steel—
Andrews Steel Co.
Heppenstall Forge & Knife Co.

Rotary Drilling Equipment—
Emsco Derrick & Equip. Co.
Frick-Reid Supply Co.
International Derrick & Equipment Co.
Link-Belt Co.
Lucey Mfg. Co.
National Supply Co.
Oil Well Supply Co.
Republic Supply Co.
Titusville Iron Works Co.

Rotary Lines (See Rope—Wire)—

Rotary Post—
Reed Roller Bit Co.

Rotary Tool Joints—
Bartlesville Supply Co.
Hughes Tool Co.

Rust Preventatives—
Dearborn Chemical Co.
Eagle-Picher Lead Co.

S

Sand Lines—Manila—
Ajax Rope Co., Inc.
Plymouth Cordage Co.

Sand Lines—Wire—
Ajax Rope Co., Inc.
Broderick & Bascom Rope Co.
Hazard Mfg. Co.
Wickwire-Spencer Steel Corp.

Screens—Oil Well—
Layne & Bowler Co.

Screens—Water Well—
Layne & Bowler Co.

Screws Temper—
Burns Tool Co.

Securities—Oil—
Pforzheimer, Carl H., & Co.

Separators—Centrifugal—
Miller, Max B., & Co.

Separators—Gas and Oil—
Smith Separator Co.

Separators—Steam—
Vois Engineering Equipment Co.

Sheet Lead—Chemical and Antimonial —
Eagle-Picher Lead Co.

Sheets —Corrugated, Black and Galvanized—
American Rolling Mill Co.
American Sheet & Tin Plate Co.
Byerson, Jos. T., & Son, Inc.
United Alloy Steel Corp.

Sheets—Iron—
American Rolling Mill Co.

Sheets—Steel—
American Rolling Mill Co.
American Sheet & Tin Plate Co.
Sheffield Steel Corp.
United Alloy Steel Corp.

Shingles—Asbestos—
Johns-Manville, Inc.

Sliding—Galvanized Iron—
American Rolling Mill Co.

Sleeves—
Dayton Pipe Coupling Co.
Dresser, S. R. Mfg. Co.

Sleeves—Split—
Dayton Pipe Coupling Co.
Dresser, S. R., Mfg. Co.

Smoke Stacks—
Donovan Boiler Works.

Snuffers—Fire—
Simplex Equipment Co.

Sockets—
Acme Fishing Tool Co.
Bridgeport Machine Co.
Spang & Co.

Sockets—Sucker Rod—
Guiberson Corp.

Sockets—Swivel—
Arbon, Paul & Co.

Sockets—Wire Rope—
Chicago Steel Foundry Co.

Soda Ash—
Mathieson Alkali Works, Inc.

Soda—Caustic—
Mathieson Alkali Works, Inc.

Solders—Bar and Wire—
Eagle-Picher Lead Co.
Hoyt Metal Co.

Spark Plugs—
Mosler Metal Products Corp.

Spears—
Acme Fishing Tool Co.
Brown Tool Co., Inc.

Sprockets—Power Transmission—
Ajax Iron Works
Chain Belt Co.

Stands—Vise—
Nye Tool & Machine Works

Steel—All Kinds—
Ryerson, Jos. T., & Son, Inc.

Steel—Alloy—
Central Steel Co.
Timken Roller Bearing Co.
United Alloy Steel Corp.

Steel—Bit—
Central Steel Co.
United Alloy Steel Corp.

Steel—Hot Rolled Strip—
Central Steel Co.

Steel—Special—
Andrews Steel Co.
Central Steel Co.
United Alloy Steel Corp.

Steel Fabricators—Structural—
Austin Co.
Braden Co.
Graver Corp.
International Derrick & Equipment Co.

Steel Pitmans—
International Derrick & Equipment Co.
Moore, Lee C., & Co., Inc.

Steel Plate Construction—
Chicago Bridge & Iron Works
Graver Corp.
Kaw Steel Construction Co.
Pennsylvania Engineering Works
Petroleum Iron Works Co.
Vogt, Henry, Machine Co.

Steel Wheel and Tug Rims—
International Derrick & Equipment Co.

Still Insulation—
Celite Products Co.

Stills—
Blaw-Knox Co.
Graver Corp.
Kaw Steel Construction Co.
Kellogg, M. W., Co.
McKee, Arthur G., & Co.
Newton Process Mfg. Co.
Petroleum Iron Works Co.
Smith, A. O., Corp.
Vogt, Henry, Machine Co.
Widdell Engineering Co.

Stocks and Dies—
Borden Co.
Nye Tool & Machine Works
Toledo Pipe Threading Machine Co.

Stuffing Boxes—
Axelson Machine Co.
Kansas City Hay Press Co.

Sulphuric Acid—
Eagle-Picher Lead Co.

Superheaters—Steam—
Power Plant Equipment Co.

Swabs—
Arbon, Paul, & Co.
Burt Corporation
Guiberson Corp.
Simplex Equipment Co.

Swedge Nipples—
Dresser, S. R., Mfg. Co.
Harrisburg Pipe & Pipe Bending Co.

Swing Line Equipment—
Brooks Engineering Corp.

Swivels—
Layne & Bowler Co.
Lucey Mfg. Corp.
Titusville Iron Works Co.

T

Tachometers—
Brown Instrument Co.

Tank Equipment—
Brooks Engineering Corp.
Oil Conservation Engineering Co.

Tank Insulation—
Celite Products Co.

Tanks—Bolted—
Butler Mfg. Co.
Columbian Steel Tank Co.
Maloney Tank Mfg. Co.
Parkersburg Rig & Reel Co.

Tanks—Bulk Station—
Butler Mfg. Co.
Graver Corp.

Tanks—Cylindrical—
Graver Corp.
Petroleum Iron Works Co.

Tanks—Elevated Steel—
Chicago Bridge & Iron Works
Graver Corp.

Tanks—Field Storage—
American Car & Foundry Co.
Donovan Boiler Works
Graver Corp.
Kaw Steel Construction Co.
Kewanee Boiler Co.
Maloney Tank Mfg. Co.
Petroleum Iron Works Co.
Pittsburgh-Des Moines Steel Co.
Riter-Conley Co.
United Iron Works, Inc.

Tanks—Horizontal Storage—
Graver Corp.
Kaw Steel Construction Co.
Maloney Tank Mfg. Co.

Tanks—Run Downs—
Chicago Bridge & Iron Works
Donovan Boiler Works
Graver Corp.
Kaw Steel Construction Co.
Newton Process Mfg. Co.

Tanks—Steel Storage—
Chicago Bridge & Iron Works

Tanks—Truck—
Butler Mfg. Co.
Columbian Steel Tank Co.

Tanks—Underground—
Butler Mfg. Co.
Gilbert & Barker Mfg. Co.
Graver Corp.
Kewanee Boiler Co.
Pittsburgh-Des Moines Steel Co.

Tanks—Welded—
Chicago Bridge & Iron Works
Graver Corp.
Pennsylvania Engineering Works

Taper Taps—
Hughes Tool Co.

Tapes—Measuring for Oil Gauging—
Lufkin Rule Co.
States Engineering Co.

Thermometers—Indicating and Recording—
American Schaeffer & Budenberg Corp.
Bristol Co.
Brown Instrument Co.

Thermometers—Resistance—
Brown Instrument Co.

Threading Machines—
Bignall & Keeler Machine Wks.
Cox & Sons Co., The
Landis Machine Co.

Thread Protectors—
Spang & Co.

Tires—Automobile—
Continental Supply Co.

Tires—Pneumatic & Solid—
Kelly-Springfield Tire Co.

Tires—Truck—
Kelly-Springfield Tire Co.

Tongs —
Bridgeport Machine Co.
Wilson Oil Tools Corp.

Tongs—Back Up—
Williams, J. H., & Co.

Tongs—Break Out—
Reed Roller Bit Co.
Williams, J. H., & Co.

Tongs—Casing—
Dunn Mfg. Co.
Guiberson Corp.

Tongs—Chain Pipe—
Armstrong Bros. Tool Co.
Williams, J. H., & Co.

Tongs—Pipe—
National Transit Pump & Machine Co.

Tongs—Rotary—
Dunn Mfg. Co.

Tongs—Tool Joint—
Guiberson Corp.
Hughes Tool Co.
Reed Roller Bit Co.

Tongs—Tubing—
Dunn Mfg. Co.

Tool Chests—Pipe—
Nye Tool & Machine Works

Tool Joints—
Bridgeport Machine Co.
Federal Supply Co.
Hughes Tool Co.
Lucey Mfg. Corp.
Oil Well Supply Co.
Reagan Forge & Engineering Co.

Torches—
Carbic Mfg. Co.
Oxweld Acetylene Co.

Towers—
Graver Corp.

Tractors—
Cleveland Tractor Co.
International Harvester Co. of America.

Trailers—
Spencer Trailer Co.

Transmission Belt—Rubber—
Goodrich, B. F., Rubber Co.
United States Rubber Co.

Transmission Lining—
Stanley Belting Corp.

Traveling Block—
Lucey Mfg. Corp.
Reagan Forge & Engineering Co.
Wright Mfg. Co.

Trenchers—Vertical Boom—
Barber-Greene Co.

Trucks—Motor—
Ford Motor Co.
General Motors Truck Co.
Graham Brothers
International Harvester Co. of America

Tubes—Boiler, Charcoal Iron—
Byers, A. M., Co.
Reading Iron Co.

Tubes—Boiler Steel—
Continental Supply Co.
National Tube Co.
Ryerson, Jos. T., & Sons, Inc.

Tubing—
Babcock & Wilcox Tube Co.
Byers, A. M., Co.
Central Tube Co.
Continental Supply Co.
National Tube Co.
Pittsburgh Steel Products Co.
Reading Iron Co.
Republic Iron & Steel Co.
South Chester Tube Co.
Spang, Chalfant & Co., Inc.
Superior Tube Co.
Wheeling Steel Corp.

Tubing Catchers—
Dunn Mfg. Co.
Guiberson Corp.

Tubing Protectors (See Rod Guides)—

Tubular Goods—
Babcock & Wilcox Tube Co.
Central Tube Co.
Continental Supply Co.
Oil Well Supply Co.
Pittsburgh Steel Products Co.
Republic Iron & Steel Co.
Spang, Chalfant & Co., Inc.
Wheeling Steel Corp.

Tubular Goods—Wrought Iron—.
Byers, A. M., Co.
Reading Iron Co.

Turbines for Lighting Equipment
Lucey Mfg. Corp.
Westinghouse Electric & Mfg. Co.

U

Underreamer Body Steel—
Andrews Steel Co.
Heppenstall Forge & Knife Co.

Underreamers—
Bridgeport Machine Co.
Brown Tool Co., Inc.
Guiberson Corp.
Wilson Oil Tools Corp.

Unions—
Central Forging Co.
Dart, E. M., Mfg. Co.
Jefferson Union Co.

V

Valuations—
American Appraisal Co.

Valves—Blow-Off—
Homestead Valve Mfg. Co.
Merco Norstrom Valve Co.

Valves—Brass & Bronze—
Homestead Valve Mfg. Co.
Lunkenheimer Co.
Reading Steel Casting Co.
Walworth Co.

Valves—Cast Steel—
Chapman Valve Mfg. Co.
Homestead Valve Mfg. Co.
Walworth Co.

Valves—Check—
Gaso Pump & Burner Mfg. Co.
Lunkenheimer Co.
Walworth Co.

Valves—Drop Forged Steel—
Edwards Valve & Mfg. Co.
Vogt, Henry, Machine Co.

Valves—Gate—High and Low Pressure—
Chapman Valve Mfg. Co.
Crane Co.
Darling Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
Kerotest Mfg. Co.
Ludlow Valve Mfg. Co.
Lunkenheimer Co.
Murray Tool & Supply Co.
Powell, Wm., Co.
Walworth Co.

Valves—Iron—
Chapman Valve Mfg. Co.
Lunkenheimer Co.
Merco Nordstrom Valve Co.
Reading Steel Casting Co.
Walworth Co.

Valves—Metal Pump—
Durabla Mfg. Co.

Valves—Pump—
Garlock Packing Co.
United States Rubber Co.

Valves—Relief—Supersensitive—
Davis, G. M., Regulator Co.

Valves—Steel—
Chapman Valve Mfg. Co.
Edward Valve Mfg. Co.
Kerotest Mfg. Co.
Lunkenheimer Co.
Metric Metal Works
Powell, Wm., Co.
Reading Steel Casting Co.
Walworth Co.

Valves—Tank Vent —
Brooks Engineering Corp.
Oil Conservation Engineering Co.

Valves—Working Barrel—
Atlas Ball Co.
Axelson Machine Co.
D&B Pump & Supply Co.

Hough, Charles N., Mfg. Co.
Northrup Equipment Co.
Oil Well Supply Co.

Varnishes—
Arco Company, The
Detroit Graphite Co.
Sherwin-Williams Co.

Ventilators—Roof—
Burt Mfg. Co.

Vises—Bench—
Nye Tool & Machine Works

Vises—Pipe—
Nye Tool & Machine Works

Vises—Post—
Nye Tool & Machine Works

W

Wagons—Truss Wheel—
Athey Truss Wheel Co.

Walking Beams—Steel—
Emsco Derrick & Equipment Co.
Moore, Lee C., & Co., Inc.

Water Cooling Systems—
Power Plant Equipment Co.

Waterproofing—Concrete—
Master Builders Co.

Waterproofing Materials—
Celite Products Co.

Water Softeners and Filters—
Butler Mfg. Co.
Graver Corp.

Wax—
Barnsdall Refining Co.
Gulf Refining Co.
Pure Oil Co.

Weight Indicators—
Hughes Tool Co.

Welding Accessories—Electric—
Wilson Welder & Metals Co.

Welding and Cutting Apparatus—
Carbic Mfg. Co.
Oxweld Acetylene Co.

Welding Machines—Electric—
Wilson Welder & Metals Co.

Welding Supplies—
Oxweld Acetylene Co.

Welding Wire—
Frick-Reid Supply Co.
Oxweld Acetylene Co.
Wilson Welder & Metals Co.

Well Shooting—
Eastern Torpedo Co.
Kinley, M. M.
Zero Hour Torpedo Co.

Wheels—Pipe Cutter—
Nye Tool & Machine Works

Winches—
Braden Co.
Brooks Engineering Co.
Oil Conservation Engineering Co.

Wire Lines (See Cables—Steel—

Wood Patterns and Models—
Gaso Pump & Burner Mfg. Co.

Working Barrels—
Axelson Machine Co.
D&B Pump & Supply Co.
D. & N. Specialty Co.
Franklin Valveless Engine Co.
Frick-Reid Supply Co.
Hough, Charles N., Mfg. Co.
McGregor, Working Barrel Co.
Norris, W. C.
Northrup Equipment Co.
Oil Well Supply Co.

Wrenches—Closet Spuds—
Nye Tool & Machine Works

Wrenches—Drop Forged—
Williams, J. H., & Co.

Wrenches—Pipe—
Trimont Mfg. Co.
Walworth Co.

Wrenches—Ratchet—
Dresser, S. R., Mfg. Co.
Nye Tool & Machine Works

Z

Zinc Oxide—
Eagle-Picher Lead Co.

Oklahoma-Kansas and Eastern Pipeline Report

OKLAHOMA-KANSAS PIPELINE STATEMENT FOR JULY

Runs

	Month	Daily Av.
*Prairie Pipe Line Co.	4,061,000	131,000
Gulf Pipe Line Co.	1,294,235	41,753
Texas Pipe Line Co.	620,352	20,011
Magnolia Pet. Co.	1,197,214	38,620
Empire Pipe Line Co.	701,728	22,636
Cosden Pipe Line Co.	798,341	25,753
Sinclair Pipe Line Co.	1,817,530	58,630
*Other lines	7,731,000	261,000
Total July	18,371,500	589,403
Total June	17,014,843	567,161
Difference	1,356,658	22,242

Shipments

	Month	Daily Av.
†Prairie Pipe Line Co.	4,224,294	136,590
Gulf Pipe Line Co.	1,112,480	35,886
Texas Pipe Line Co.	748,862	24,157
Magnolia Pet. Co.	1,548,204	49,942
Empire Pipe Line Co.	817,678	26,373
Cosden Pipe Line Co.	841,580	27,157
†Sinclair Pipe Line Co.	2,515,377	81,141
*Other lines	7,967,000	257,000
Total July	19,785,635	638,246
Total June	19,357,803	645,260
Difference	427,832	7,014

Stocks

*Prairie Oil & Gas Co.	27,450,000
*Prairie Pipe Line Co.	2,000,000
Gulf Pipe Line and Gypsy Oil	6,582,110
The Texas Company	2,978,951
Magnolia Pet. Co.	4,126,562
Empire Pipe Line Co.	2,620,291
Cosden Pipe Line Co.	1,573,434
*Sinclair Crude Oil Purchasing Co.	18,000,000
Carter Oil Co.	12,708,113
*Other lines	9,300,000
Total July	87,649,450
Total June	89,443,202
Difference	1,793,752

*Estimated.
†Prairie shipments include Texas crude oil. Sinclair shipments include Texas and Wyoming crude oil.
Note: Stocks do not include 4,800,000 bbls. of crude oil held in storage on private tank farms and leases.

EASTERN PIPE LINES

Runs From Wells

In the following table will be found the regular receipts from wells by various pipelines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for July and August:

	July, '26	Aug., '26
Nat. Transit	163,355.48	161,323.78
S. W. Pa. P. L.	101,686.03	96,367.93
Eureka P. L.	392,989.67	381,142.94
Buckeye P. L. (Macksburg)	306,269.80	307,707.87
Buckeye P. L. (Cleveland)	11,170.47	11,268.78
Buckeye P. L. (Lima, etc.)	137,149.47	128,103.04
Indiana P. L.	10,826.41	10,826.64
Cumberland P. L.	282,711.58	278,950.07
N. Y. Transit	21,334.18	20,228.51
Tidewater P. L.	168,664.93	166,918.60
Pure Oil Co.	176,480.50	168,350.74
Emery P. L.	53,064.83	53,942.07
Indian Ref.	104,990.12	103,127.03
Paragon Dev.	22,718.44	22,043.09
Pittsburgh P. L.	6,486.24	5,960.11
Total	1,959,400.15	1,916,270.20
Daily average	63,206.46	61,815.17

Note—Indian Refining Co. also reported other receipts of 255,477.05 bbls. Paragon Refining Co. had other receipts of 154,122.42 bbls. Paragon Development had other receipts of 1,528.22 bbls. Pure Oil had other receipts of 72,926.96 bbls.

Petroleum Deliveries

The following tables exhibit the shipments or regular deliveries of various pipelines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for July and August:

	July, '26	Aug., '26
Nat. Transit	370,891.32	419,515.29
S. W. Pa. P. L.	409,458.00	407,494.62
Eureka P. L.	194,592.54	206,253.08
Buckeye P. L. (Macksburg)	154,972.89	139,983.47
Buckeye P. L. (Cleveland)	1,408.19	727.93
Buckeye P. L. (Lima, etc.)	896,654.71	787,040.76
Indiana P. L.	995,699.54	996,002.96
Cumberland P. L.	168,426.65	149,487.18
Southern P. L.	.....	2,461.03
N. Y. Transit	644,783.66	437,982.40
Northern P. L.	185,783.37	199,543.86
Tidewater P. L.	107,643.02	130,278.71
Pure Oil Co.	238,473.30	269,867.54
Emery P. L.	54,161.96	56,844.78
Paragon Ref.	159,136.74	134,578.87
Indian Ref.	372,128.62	357,290.83
Paragon Dev.	24,924.64	18,580.37
Pittsburgh P. L.	7,169.75	5,727.74
Total	4,989,308.90	4,709,789.43
Daily average	160,946.45	151,925.69

Gross Stocks

The gross stocks held by various pipelines in the oil producing sections of New York, Pennsylvania, West Virginia, Ohio, Indiana and Kentucky, at the close of July and August were as follows:

	July, '26	Aug., '26
Nat. Transit	1,053,770.84	1,095,592.26
S. W. Pa. P. L.	683,787.99	644,407.20
Eureka P. L.	1,483,121.36	1,426,004.84
Buckeye P. L. (Macksburg)	415,112.82	461,200.92
Buckeye P. L. (Cleveland)	85,333.91	93,451.86
Buckeye P. L. (Lima, etc.)	2,428,415.17	2,585,933.06
Indiana P. L.	576,702.06	578,735.80
Cumberland P. L.	633,819.77	601,941.96
Southern P. L.	476,270.69	404,780.18
N. Y. Transit	822,714.93	748,135.37
Northern P. L.	433,011.93	385,641.31
Pure Oil Co.	450,205.94	429,758.51
Emery P. L.	37,324.53	34,677.94
Paragon Ref.	36,255.80	55,343.93
Indian Ref.	110,400.30	109,296.55
Paragon Dev.	4,313.95	9,505.96
Pittsburgh P. L.	4,124.64	4,541.24
Total	9,734,686.53	9,668,946.98
Increase	148,782.41	*65,739.55

*Decrease.

Grades of Oil

The following table shows the amount of the different grades of oil held by the eastern pipelines at the close of July and August showing the gross stocks of the above fields:

	July, '26	Aug., '26
Pennsylvania	4,047,418.29	4,021,829.40
Lima	859,783.19	826,740.17
Kentucky	1,249,214.91	1,185,429.48
Mid-Continent	3,502,567.49	3,593,693.56
Illinois	75,702.65	41,254.37
Total	9,734,686.53	9,668,946.98

Daily Average Runs

The following table shows the daily average runs of the Pennsylvania, Lima and Kentucky oil fields for the past four years:

	1923	1924	1925	1926
January	76,790	62,638	56,831	55,630
February	71,092	68,023	60,606	60,394
March	76,592	68,721	60,575	61,644
April	75,614	71,058	63,062	63,919
May	77,365	67,342	59,217	60,580
June	77,592	63,230	61,270	64,131
July	71,879	64,208	62,639	63,206
August	76,910	59,942	59,686	61,815
September	72,358	62,930	62,510	.....
October	76,256	64,976	60,996	.....
November	70,762	56,283	59,350	.....
December	69,271	55,814	57,974	.....

Daily Average Shipments

The following table gives daily average shipments from the Pennsylvania, Lima and other fields for the past four years:

	1923	1924	1925	1926
January	171,067	145,518	157,889	156,056
February	164,219	148,732	160,863	159,488
March	185,487	147,098	164,591	150,239
April	170,751	147,611	151,429	152,371
May	177,102	134,997	146,995	160,988
June	173,598	143,010	149,467	160,257
July	168,330	124,187	161,338	160,945
August	162,776	123,120	151,730	151,929
September	137,266	127,325	156,719	.....
October	134,597	123,170	145,388	.....
November	131,426	124,400	142,582	.....
December	139,909	151,392	150,162	.....

Gross Stocks

In the following table will be found the gross stocks of the various lines of Pennsylvania, Lima and Kentucky oil fields including oil received from other lines, at the close of each month for the past three years:

	1924	1925	1926
January	12,907,202	11,353,276	
February	11,844,068	11,192,924	
March	10,906,752	11,158,297	
April	10,922,742	11,062,082	
May	11,325,309	11,207,562	
June	11,545,204	11,093,796	
July	12,062,361	11,067,453	
August	12,221,676	10,974,481	
September	12,206,836	10,781,753	
October	12,664,061	11,086,850	
November	12,268,530	11,068,168	
December	11,583,680	10,458,445	

Franklin Pipe Line Co.

The following table exhibits the c of the Franklin Pipe Line at the business for the months named counted in the stocks and averages above:

	Receipts	Shipmts.
1925—		
July	2,639.34	3,174.10
August	3,216.97	1,577.99
September	2,929.99	5,252.05
October	2,869.75	1,499.34
November	759.66	2,571.32
December	2,661.87	3,441.67
1926—		
January	2,990.16	1,478.35
February	2,580.23	2,776.19
March	2,754.62	1,732.77
April	3,137.40	4,519.68
May	2,933.29	2,096.35
June	3,217.62	1,695.16
July	3,025.86	4,075.11

The Illinois Field

The following table gives the repor of the Illinois Pipe Line Co. in Illinois:

Gross stocks Sept. 1	1,3
Runs from wells	
Other receipts	
Regular deliveries	
Other deliveries	

The amount of Illinois oil run by Water Pipe Co. in August was 29,60 and deliveries were 70,213.05 bbls. these figures to those of the Illin Line Co. makes the runs and deli follows:

1925—	
August	673,652.38
September	706,434.87
October	706,532.00
November	664,556.30
December	666,086.99
1926—	
January	665,243.62
February	632,611.93
March	753,300.74
April	610,957.04
May	682,416.07
June	698,102.34
July	
August	

The Tide Water Pipe Co. Ltd., livered in August bbls. homa oil.

AVERAGE DAILY RECEIPTS OF CALIFORNIA OIL AT ATLANTIC AND GULF PORTS

Average bbls. per day—	ATLANTIC PORTS						GULF COAST PORTS					
	Baltimore	Boston	New York	Philadelphia	Others	Total	New Orleans Galveston	Port Arthur Baton Rouge	Sabine Pass	Tampa	Total	Total All Ports
April	19,033	5,133	28,333	13,499	22,867	88,767	.....	.....	4,700	.....	4,700	93,467
May	27,065	7,902	15,387	12,452	17,742	81,549	.....	.....	4,032	.....	4,032	85,581
June	24,533	11,000	22,800	34,467	15,167	107,967	.....	.....	.....	.....	.....	107,967
July	15,677	2,903	24,678	12,065	12,516	67,839	.....	.....	.....	645	645	68,484

AVERAGE DAILY IMPORTS OF PETROLEUM AT PRINCIPAL UNITED STATES PORTS

Average bbls. per day—	ATLANTIC PORTS						GULF COAST PORTS					
	Baltimore	Boston	New York	Philadelphia	Others	Total	New Orleans Galveston	Port Arthur Baton Rouge	Sabine Pass	Tampa	Total	Total All Ports
April	15,200	14,000	76,833	10,833	29,333	156,000	19,200	24,900	2,000	4,433	50,533	206,533
May	12,387	12,258	75,516	11,645	21,548	133,355	17,710	45,226	1,936	5,677	65,549	198,904
June	15,800	10,800	87,300	6,500	21,267	141,667	25,300	42,367	6,567	3,900	78,033	219,700
July	21,517	7,774	89,548	4,774	26,194	149,806	*13,226	†39,774	22,032	4,452	59,484	209,290

*Received at Galveston district. †Received at New Orleans and Baton Rouge. ‡Received at Port Arthur and Sabine Pass.

GROSS PRODUCTION OF THE UNITED STATES FOR 12 MONTHS
(IN BARRELS)

		California	Oklahoma	Texas	Kansas	Arkansas	Louisiana	Rocky Mountains	Eastern Fields	Total
August:	Month	21,055,530	14,441,040	11,936,079	2,558,087	7,450,598	1,858,543	3,250,448	3,177,000	65,727,325
	Daily average	677,530	465,840	385,022	114,777	240,341	56,727	104,853	102,484	2,147,574
September:	Month	20,062,762	14,826,540	11,264,690	3,393,270	6,457,950	1,776,570	3,235,635	3,212,000	64,229,417
	Daily average	668,759	494,168	375,496	113,109	215,265	59,219	107,854	107,067	2,141,314
October:	Month	20,015,076	14,921,199	11,196,511	3,477,146	6,409,281	1,871,820	3,394,990	3,248,000	64,533,923
	Daily average	645,648	481,329	361,178	112,166	206,751	60,382	109,500	104,774	2,081,094
November:	Month	19,095,907	14,590,980	10,650,087	3,221,760	5,927,955	1,758,883	3,088,131	2,992,000	61,325,703
	Daily average	636,530	486,366	355,003	107,397	197,599	58,629	102,937	99,733	2,044,179
December:	Month	19,249,711	14,128,848	10,930,455	3,308,816	6,047,883	1,763,966	3,187,164	3,086,900	61,704,743
	Daily average	620,959	455,608	352,595	106,736	195,093	56,902	102,813	99,552	1,990,636
January:	Month	19,069,562	13,674,813	11,049,715	3,250,536	5,489,604	1,736,390	3,136,280	3,014,000	60,421,900
	Daily average	615,147	441,123	356,442	104,856	177,084	55,690	104,396	97,226	1,948,476
February:	Month	17,163,963	13,292,016	9,943,232	2,977,812	4,756,836	1,584,184	2,778,605	2,931,000	55,427,648
	Daily average	612,999	442,572	355,115	102,779	169,887	56,578	99,236	104,678	1,979,559
March:	Month	18,825,786	14,312,886	11,014,238	3,334,887	5,115,837	1,889,662	3,161,350	3,349,000	61,003,246
	Daily average	608,283	461,706	355,298	107,577	165,027	60,957	101,976	108,032	1,967,842
April:	Month	18,091,771	14,468,190	10,799,760	3,330,120	5,127,510	1,959,570	3,221,404	3,183,000	61,212,325
	Daily average	603,059	482,273	359,992	111,004	170,917	65,319	104,339	106,100	2,040,411
May:	Month	18,667,144	14,607,008	11,940,797	3,516,640	5,482,939	2,321,938	3,459,489	3,317,000	64,312,955
	Daily average	602,166	467,968	385,187	113,440	176,879	71,998	111,596	107,000	2,074,612
June:	Month	18,269,417	14,073,510	11,782,550	3,366,450	5,044,760	2,305,480	3,437,905	3,365,000	63,644,072
	Daily average	608,981	469,117	392,785	112,215	168,822	73,516	114,597	112,167	2,121,469
July:	Month	18,743,199	14,557,482	13,983,759	3,613,267	5,019,593	2,172,813	3,326,664	3,348,000	64,524,777
	Daily average	604,619	472,822	451,089	116,557	161,932	70,123	107,634	108,000	2,081,441
	Total 12 months	228,359,670	170,988,013	136,493,073	40,248,791	68,251,037	22,800,829	38,697 945	38,22? 000	743,...
	Daily average	625,369	468,460	373,954	110,271	187,263	62,468	106,023	104,718	2,035,...

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MISS TULSA—Queen of Beauty, High Priestess of Pulchritude—we salute you!

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Fig. 601.

To win in a local bathing beauty contest is honor enough. To be a victor in a nation-wide contest of victors is a tribute that comes to few.

* * *

Fig. 604.

Figure 601—(450 to 600 pound pressure)—a sturdy pump designed for oil or water service. Extra long stroke gives straight line pull; practical absence of gasket surface adds to long, trouble-free operation.

Figure 604—Gaso Walking Beam and Power Pump for gas or vacuum. Constructed to stand world of abuse. For taking gas from pumping well or putting vacuum on well.

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